

**EPA Superfund**  
**Record of Decision:**

**YUMA MARINE CORPS AIR STATION**  
**EPA ID: AZ0971590062**  
**OU 02**  
**YUMA, AZ**  
**12/02/1997**

EPA 541-R98-028

<IMG SRC 980280>

SFUND RECORDS CTR  
0452-00124

Final  
Record of Decision for Operable Unit 2  
Marine Corps Air Station  
Yuma, Arizona

<IMG SRC 98028A>

August 29, 1997

Prepared for  
Southwest Division  
Naval Facilities Engineering Command  
San Diego, California

Prepared by  
  
Uribe & Associates  
220 California Avenue  
Palo Alto, CA 94306  
(415) 325-9195

Contract N68711-94-D-1611, Delivery Order 6

U&A Project 180-06

<IMG SRC 98028B>

Final

Record of Decision for Operable Unit 2  
Marine Corps Air Station  
Yuma, Arizona

<IMG SRC 98028C>

August 29, 1997

Prepared for  
Southwest Division  
Naval Facilities Engineering Command  
San Diego, California

Prepared by

Uribe & Associates  
220 California Avenue  
Palo Alto, CA 94306  
(415) 325-9195

Contract N68711-94-D-1611, Delivery Order 6

U&A Project 180-06

Draft Final Record of Decision for Operable Unit 2  
Marine Corps Air Station  
Yuma, Arizona

Contents

Section	Page
1 Declaration.....	1-1
1.1 Introduction.....	1-1
1.2 Site Name and Location.....	1-1
1.3 Statement of Basis and Purpose.....	1-2
1.4 Assessment of the Site.....	1-2
1.5 Description of the Selected Remedy.....	1-3
1.6 Statutory Determinations.....	1-7
2 Decision Summary.....	2-1
2.1 Introduction.....	2-1
2.2 MCAS Yuma Site Location and Description.....	2-2
2.3 MCAS Yuma Installation Operational History.....	2-3
2.4 Enforcement and Regulatory History.....	2-3
2.5 Operable Unit 2 Site Selection History.....	2-4
2.6 Operable Unit 2 Site Descriptions.....	2-6
2.6.1 Introduction.....	2-6
2.6.2 CAOC 1: Flight Line.....	2-6
2.6.3 CAOC 2: Shop Areas.....	2-7
2.6.4 CAOC 3: Auto Hobby Shop.....	2-7
2.6.5 CAOC 4: Radar Hill Disposal Area.....	2-8
2.6.6 CAOC 5: Old 2nd LAAMBN Compound.....	2-8
2.6.7 CAOC 6: First Sewage Lagoon.....	2-9
2.6.8 CAOC 7: Fire School Area.....	2-9
2.6.9 CAOC 8: Southeast Station Landfill.....	2-10
2.6.10 CAOC 9: Southeast Sewage Lagoon.....	2-11
2.6.11 CAOC 10: Ordnance Munitions Disposal Area.....	2-11
2.6.12 CAOC 11: Radiation Disposal Pipes.....	2-12
2.6.13 CAOC 12: Tear Gas Burial Area.....	2-13
2.6.14 CAOC 13: Drain Field Area.....	2-13
2.6.15 CAOC 14: Drain Field South of Building 97.....	2-13
2.6.16 CAOC 15: Hazardous Waste USTs 363 and 364.....	2-14
2.6.17 CAOC 16: Hazardous Waste USTs, Building 230-2 and 230-4.....	2-14
2.6.18 CAOC 17: Hazardous Waste Underground Storage Tank 1708-3.....	2-14
2.6.19 CAOC 18: Old Drum Storage Area.....	2-15
2.7 Highlights of Community Participation.....	2-15
2.8 Scope and Role of Operable Unit 2.....	2-16
2.9 Summary of Field Investigation.....	2-17
2.10 Summary of Risk Assessment.....	2-18
2.10.1 Human Health Risk Assessment.....	2-18
2.10.2 Identification of COPCs.....	2-18
2.10.3 Exposure Assessment.....	2-20
2.10.4 Toxicity Assessment.....	2-21
2.10.5 Development of Risk-Based Criteria.....	2-22
2.10.6 Summary of Risks at Individual CAOCs.....	2-23
2.11 Summary of Ecological Risks.....	2-26
2.12 Description of Alternatives.....	2-27

2.12.1 Introduction.....	2-27
2.12.2 CAOCs Requiring Remediation of ACM in Soil.....	2-27
2.12.3 Alternatives Considered for Remediating CAOCs 4, 7, and 9.....	2-28
2.12.4 CAOCs with Potential Health Risks.....	2-30
2.12.5 Alternatives Considered for Responding to Potential Health Risks at CAOCs 1, 8A, and 10.....	2-30
2.13 Summary of the Comparative Analysis of Alternatives.....	2-32
2.13.1 Introduction.....	2-32
2.13.2 Applicable or Relevant and Appropriate Requirements.....	2-33
2.13.3 Preferred Alternative for ACM in Soil.....	2-34
2.13.4 Preferred Alternative for Responding to Potential Health Risks at CAOCs 1, 8A and 10 .....	2-39
2.14 The Selected Remedies.....	2-42
2.14.1 Selected Remedy for ACM in Soils.....	2-42
2.14.2 Selected Remedy for Potential Health Risks at CAOCs 1, 8A, and 10.....	2-43
2.15 Statutory Determinations.....	2-45
2.15.1 Introduction.....	2-45
2.15.2 Statutory Determinations for Selected Remedy for ACM in Soils...	2-45
2.15.3 Statutory Determinations for Selected Remedy for Potential Health Risks at CAOCs 1, 8A, and 10.....	2-50
2.16 Documentation of Significant Changes.....	2-53
3 Responsiveness Summary.....	3-1
3.1 Overview.....	3-1
3.2 Background on Community Involvement.....	3-1
3.3 Summary of Comments Received During Public Comment Period and Department of the Navy Responses.....	3-2
4 References.....	4-1
5 Abbreviations/Acronyms.....	5-1

## Appendices

- A Response to U.S. Environmental Protection Agency and Arizona Department  
of Environmental Quality Comments on the Draft Record of Decision for  
Operable Unit 2, Marine Corps Air Station, Yuma, Arizona
- B Community Relations Activities Conducted by Navy

## Table

- 2-1 Chemicals of Potential Concern (COPC) for OU2
- 2-2 Maximum Concentrations of Volatile Organic Compounds Detected as COPCs at 0 to 10 Feet
- 2-3 Maximum Concentrations of Semi-Volatile Organic Compounds and Total Petroleum Hydrocarbons Detected as COPCs
- 2-4 Maximum Concentrations of Pesticides and PCBs Detected as COPCs at 0 to 10 Feet
- 2-5 Maximum Detected Values and Background Threshold Limit Values (TLV) for Metals Detected at 0 to 10 Feet
- 2-6 ARARs for Remediation of Asbestos-Contaminated Soil at MCAS Yuma
- 2-7 ARARs for Potential Health Risks at MCAS Yuma
- 2-8 Human Health Based Guidance Levels (HBGLs) for Ingestion of Contaminants in Soil at CAOC 1, 8A, and 10
- 2-9 Alternative 3, Soil Volume Estimate
- 2-10 Cost Estimate for Alternative 3: Cleanup of ACM on Soil Surface and Excavation and Disposal of Soil Mixed with ACM
- 2-11 Cost Estimate for Cleanup of ACM on Soil Surface
- 2-12 Potential ARARs for Remedial Action for MCAS Yuma

## Figure

- 1-1 Location Map for MCAS Yuma
- 1-2 Location of CAOCs in OU2
- 2-1 CAOC 1: Feature and Boring Location Map
- 2-2 CAOC 1: Total PAH Concentration Contours for Surface Samples, Southern Detail
- 2-3 CAOC 1: Total PAH Concentration Contours for Surface Samples, Northern Detail
- 2-4 CAOC 4: Location of ACM and ACM-Contaminated Soil
- 2-5 CAOC 7: Location of Subunit 7A
- 2-6 CAOC 7: Location of Subunit 7B
- 2-7 CAOC 8: Feature and Boring Location Map
- 2-8 CAOC 9: Location of ACM Debris
- 2-9 CAOC 10: Feature Map
- 2-10 CAOC 10: PAH Sampling Locations with Total PAH Concentrations

## **1 Declaration**

### **1.1 Introduction**

This Record of Decision (ROD) for Operable Unit (OU2) documents the remedial action plan for OU2 at Marine Corps Air Station (MCAS), Yuma, Arizona. This ROD was prepared by Uribe & Associates (U&A) for Southwest Division Naval Facilities Engineering Command (Southwest Division) under Contract N68711-94-D-1611, Delivery Order 6.

### **1.2 Site Name and Location**

The Marine Corps Air Station (MCAS), covering approximately 3,000 acres, is located in the City and County of Yuma, Arizona (Figure 1-1). Marine Corps Air Station Yuma (Station) was declared a permanent Air Force installation in 1954. In January 1959, the Station and its associated range facilities were transferred to the U.S. Navy. The Station currently operates the airport facility as a joint military/civilian airport. MCAS Yuma is located on the northern portion of Yuma Mesa, approximately 60 to 70 feet above and four miles from the Colorado River. The City of Yuma, the nearest municipality, is located approximately one mile northwest of the Station.

The final Federal Facility Agreement (FFA) was signed in January, 1992, by the U.S. Environmental Protection Agency (U.S. EPA), the Department of the Navy (Navy), and the Arizona Department of Environmental Quality (ADEQ) to establish a framework and schedule for implementing environmental investigations and appropriate remedial actions under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Two Operable Units (OUs) were established under the auspices of the FFA. OU2 includes surface disposal units and contamination shallower than ten feet below ground surface. The OU2 Remedial Investigation included the following CERCLA areas of concern (CAOCs), as shown on Figure 1-2:

- CAOC 1, Flight Line
- CAOC 2, Shops Area
- CAOC 3, Auto Hobby Shop
- CAOC 4, Radar Hill Disposal Area
- CAOC 5, Old 2nd LAAMBN Compound
- CAOC 6, First Sewage Lagoon
- CAOC 7, Fire School Area
- CAOC 8, Southeast Station Landfill
- CAOC 9, Southeast Sewage Lagoon
- CAOC 10, Ordnance Munitions Disposal Area
- CAOC 11, Radiation Disposal Pile
- CAOC 12, Tear Gas Burial Area
- CAOC 13, Drain Field Area
- CAOC 14, Lagoon South of Building 97
- CAOC 15, Hazardous Waste USTs 363 and 364
- CAOC 16, Hazardous Waste USTs, Building 230-2 and 230-4
- CAOC 17, Hazardous Waste Underground Storage Tank 1708-3
- CAOC 18, Old Drum Storage Area

### **1.3 Statement of Basis and Purpose**

This ROD presents a response action for OU2, which consists of 18 CAOCs that were identified as possible locations of soil contamination from past activities at MCAS Yuma. These areas were selected in accordance with CERCLA as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and to the extent practicable, the National Contingency Plan (NCP). This ROD explains the basis for selecting the response action for the 18 CAOCs comprising OU2.

Information supporting the selected response action is contained in the Administrative Record for MCAS Yuma. The U.S. EPA, Navy, and ADEQ concur with the selected response actions.

#### **1.4 Assessment of the Site**

A Remedial Investigation (RI) for OU2 was performed by Jacobs Engineering Group (JEG, 1996). As part of the RI, a human health and ecological risk assessment was performed for each of the 18 CAOCs to assess the potential impacts of hazardous substances on human health, the environment, and groundwater quality (JEG, 1995b). Based on the RI, U.S. EPA, ADEQ, and the Navy agreed that 12 of the CAOCs require no further action. Six of the CAOCs require action:

- CAOCs 4, 7, and 9: Asbestos-containing building materials have been identified in construction debris and have the potential to release asbestos fibers into the environment.
- CAOCs 1 and 10: The human health risk assessment indicated that residential use of these CAOCs had a potential to present an unacceptable level of carcinogenic risk.
- CAOC 8A: Intrusive sampling was not conducted at the southeast station landfill during the RI because of potential drilling hazards (Section 2.6.9). Based on the human health risk assessment, it was concluded that a landfill cap was not required under the current land use. However, since the interior of the landfill was not investigated during the RI, the risk from exposure to the landfill interior is unknown.

A Feasibility Study (FS) was conducted to evaluate remedial alternatives for the six CAOCs. For, CAOCs 4, 7, and 9, where surface disposal of asbestos waste was confirmed, the FS developed a remedial approach that minimizes potential health threats and allows unrestricted use of the CAOCs. Asbestos can affect human health if left unmanaged. Asbestos-containing material in these three areas presents a substantial threat of release, which may pose a significant risk to human health and the environment if not addressed by implementing the response action selected in this ROD. This ROD describes the rationale for selecting the alternative to cleanup ACM contamination at the three CAOCs.

For CAOCs 1, 8A, and 10 the health risk assessment indicated that potential health risks were within acceptable levels under current land use, but could become unacceptable if land use changed. The FS evaluated institutional controls to protect human health.

#### **1.5 Description of the Selected Remedy**

On the basis of the data collected at the OU2 sites, no further action is necessary for 12 of the 18 CAOCs included in OU2, because these sites do not pose a threat to human health or the environment. However, remedial action is required to protect human health and comply with regulatory requirements at three of the CAOCs in OU2 because of the presence of ACM. In addition, institutional controls will be implemented to minimize potential health risks that might be associated with land use changes in CAOC 1, 8A, and 10.

##### **Selected Remedy for ACM**

Four alternatives have been developed and evaluated for the remediation of ACM at MCAS Yuma. The alternatives were based on the nine criteria established by U.S. EPA, listed below:

- Overall Protection of Human Health and the Environment
- Compliance with ARARs



- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume
- Short-Term Effectiveness
- Implementability
- Cost
- State Acceptance
- Public Acceptance

The four alternatives evaluated are listed and briefly described below:

#### **Alternative 1-No Action**

The No-Action alternative was used as a baseline alternative against which other alternatives were judged. With this alternative, there would be no action to treat, contain, or remove any of the surface ACM or ACM-contaminated soil.

#### **Alternative 2-Cleanup of Surface ACM Debris**

Under this alternative, ACM fragments visible on soil surfaces would be collected manually. Collection would include removing approximately the upper inch of soil beneath the ACM to reduce the potential for asbestos fibers remaining behind in the soil. The ACM and soils would be stockpiled, manifested, loaded, transported, and disposed of at a permitted facility.

#### **Alternative 3-Cleanup of ACM on Soil Surface and Excavation of Soils Mixed with ACM**

Under this alternative, ACM fragments visible on soil surfaces would be collected manually, as described under Alternative 2. In areas in which ACM is mixed with soil beneath the surface (CAOC 4A, north of Building 38; and CAOC 7A, limited area near the active burn pit), the contaminated soils would be excavated with conventional construction equipment.

#### **Alternative 4-Cleanup of ACM on Soil Surface, Partial Excavation, and Partial Capping**

Under this alternative, ACM fragments visible on soil surfaces would be collected manually, as described under Alternative 2. In the limited area near the active burn pit (CAOC 7A), where ACM is mixed with surface soils to a maximum depth of one foot, the contaminated soils would be excavated with conventional construction equipment, as in Alternative 3. This alternative differs from Alternative 3 in that only the central portion of the remedial unit north of Building 38 (CAOC 4A) would be excavated, since the Station has plans to develop this area. The eastern portion of CAOC 4A would be capped with asphalt.

The selected alternative for addressing asbestos at MCAS Yuma is Alternative 3, cleanup of ACM on soil surface and excavation of soils mixed with ACM. This alternative meets the nine ranking criteria that the U.S. EPA uses to evaluate alternatives.

#### **Selected Remedy for Potential Health Risks**

Two alternatives were developed and evaluated to address potential health threats identified by the human health risk assessment for CAOC 1 and CAOC 10 and the potential health threat associated with land use changes at CAOC 8A. These alternatives were based on the nine criteria listed above in the discussion of alternatives for ACM. The alternatives are listed and briefly described below.

#### **Alternative 1-No Action**

This alternative does not reduce the potential risk to human health and is unlikely to be accepted by the state or the community.

## **Alternative 2-Institutional Controls**

Institutional controls would restrict the land use of CAOC 1 and CAOC 10 to industrial/commercial use and CAOC 8A to the current use (inactive landfill/surface disposal area). The institutional controls would be implemented through the MCAS Yuma Base Master Plan (BMP), which would reference the OU2 ROD. Additions to the BMP would include a map indicating the locations of the former disposal areas in CAOC 8A. This would include execution and recordation of a VEMUR in accordance with and substantially in the form set out at Arizona Revised Statutes, Section 49-152. The VEMUR would contain language clarifying that it was executed and recorded by the federal government, or the appropriate entity of the federal government, "for itself only, and not as a covenant running with the land". In addition, it would clarify that:

- a. The parties agree that no interest in real property on behalf of the State of Arizona is created either by this VEMUR or by any notice of cancellation of this VEMUR pursuant to A.R.S. 49-152.
- b. The signature of an authorized representative of the Arizona Department of Environmental Quality (ADEQ) which appears herein acknowledges that the remediation of the property was conducted in accordance with the provisions of A.R.S 49-152.

The MCAS Yuma Base Master Plan would require that any changes in activities or land use in these CAOCs be coordinated through and reviewed by the MCAS Yuma Environmental Department. Before the land use restrictions are incorporated in the BMP, the Navy will obtain the approval of the U.S. EPA for the language of the restrictions and the location in the BMP at which the approved language will be incorporated. In the event that the Navy plans any future changes in land use at CAOCs 1, 8A, or 10, the Navy in consultation with U.S. EPA and ADEQ would re-evaluate the remedy in light of the intended land use. If the change in land use is not compatible with the remedy, the remedy may be changed pursuant to CERCLA Sections 120 and 121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) Section 300.430(4)(iii) and the ROD may be amended. If the Navy plans to excess the property to a non-federal entity, it will notify ADEQ and EPA in advance of the execution of any such transfer. The Navy will consult with ADEQ and EPA in revisiting existing land use classifications/restrictions for the CAOC (or, in the alternative, the remedial action selection) to determine if the foreseeable future land use differs from the assumptions made at the time the original remedial action decision was made. At that time, a re-evaluation of the appropriate institutional controls will be undertaken by the Navy, in consultation with ADEQ and EPA.

For CAOC 1 and CAOC 10, a change in land use from industrial to residential use would require re-evaluation of the remedy. For CAOC 8A, a change in land use involving any activities that may disrupt and expose the landfill interior would require re-evaluation of the remedy. At the time of these future activities, further investigation may be undertaken in order to determine if remediation is required and if the ROD must be amended.

The selected alternative for addressing potential health risks at CAOCs 1, 8A, and 10 is Alternative 2, institutional controls. This alternative meets the nine ranking criteria that the U.S. EPA uses to evaluate alternatives.

### **1.6 Statutory Determinations**

No response action is necessary to protect human health or the environment at 12 of the 18 CAOCs

within the OU2 site. This "no further action" alternative was selected because no contaminants found at 12 of the CAOCs were present at concentrations that pose an unacceptable risk to human health or the environment based on U.S. EPA risk guidelines. The "no further action" alternative is protective of human health and the environment and complies with federal and State of Arizona requirements that are legally applicable or relevant and appropriate to the remedial action. This action is a permanent solution to the maximum extent practicable or necessary for these CAOCs. Because this action will not result in hazardous substances remaining on site exceeding unacceptable health-based levels, the five-year review will not apply to this action.

Asbestos-containing materials (ACM) are to be removed from three CAOCs. The rationale for selecting Alternative 3 as the preferred alternative for the remediation of ACM at CAOCs 4, 7, and 9, was based on the U.S. EPA criteria listed in Section 1.5. Alternative 3 is protective of human health and the environment, complies with the State of Arizona and federal requirements that are legally applicable or relevant and appropriate to the remedial action, is cost effective, and would be a permanent solution to the maximum extent practical or necessary for OU2. Because Alternative 3 will not result in hazardous substances remaining on site exceeding acceptable health-based levels, the five-year review will not apply to this action.

The asbestos-containing material (ACM) to be removed from CAOCs 4, 7, and 9 includes transite siding, transite pipe, cement pipe, roofing materials, vinyl, fiberboard and floor tile mastic. This ACM is "nonfriable" which means that it cannot be crumbled, pulverized, or reduced to powder by hand pressure when dry (40 CFR Section 61.141). Nonfriable ACM is a CERCLA hazardous substance, but not a RCRA hazardous waste. See 40 CFR, Section 302.4 (CERCLA) and 40 CFR, Part 261 (RCRA). Since the ACM is a CERCLA hazardous substance, Alternative 3 must be conducted in a way that complies with U.S. EPA's Off-Site Policy (40 CFR Section 300.440).

The institutional controls will restrict the land use of CAOC 1 and CAOC 10 to industrial/commercial use and CAOC 8A to the current use (inactive landfill/surface disposal area). The institutional controls will be implemented through the Base Master Plan, which will reference the OU2 ROD. Additions to the Base Master Plan will include a map indicating the locations of the former disposal areas in CAOC 8A. This would include execution and recordation of a VEMUR in accordance with and substantially in the form set out at Arizona Revised Statutes, Section 49-152. The VEMUR would contain language clarifying that it was executed and recorded by the federal government, or the appropriate entity of the federal government, "for itself only, and not as a covenant running with the land". In addition, it would clarify that:

- a. The parties agree that no interest in real property on behalf of the State of Arizona is created either by this VEMUR or by any notice of cancellation of this VEMUR pursuant to A.R.S. 49-152.
- b. The signature of an authorized representative of the Arizona Department of Environmental Quality (ADEQ) which appears herein acknowledges that the remediation of the property was conducted in accordance with the provisions of A.R.S. 49-152.

The Base Master Plan will require that any changes in activities or land use in these CAOCs be coordinated through and reviewed by the MCAS Yuma Environmental Department. Before the land use restrictions are incorporated in the BMP, the Navy will obtain the approval of the U.S. EPA for the language of the restrictions and the location in the BMP at which the approved language will be incorporated. In the event that the Navy plans any future changes in land use at CAOCs 1, 8A, or 10, the Navy in consultation with U.S. EPA and ADEQ would re-evaluate the remedy in light of the intended land use. If the Navy plans to excess the property to a non-federal entity, it will notify ADEQ and EPA in advance of the execution of any such transfer. The Navy will consult with ADEQ and EPA in revisiting existing land use classifications/restrictions for the

CAOC (or, in the alternative, the remedial action selection) to determine if the foreseeable future land use differs from the assumptions made at the time the original remedial action decision was made. At that time, a re-evaluation of the appropriate institutional controls will be undertaken by the Navy, in consultation with ADEQ and EPA.

The rationale for selecting Alternative 2 as the preferred alternative for potential health risks at CAOCs 1, 8A, and 10 was based on the U.S. EPA criteria listed in Section 1.5. Alternative 2 will be protective of human health and the environment, comply with the State of Arizona and federal requirements that are legally applicable or relevant and appropriate to the remedial action, and be cost effective. Because Alternative 2 will result in hazardous substances remaining on site, a five-year review will apply to this action.

<IMG SRC 98028D>

## **2 Decision Summary**

### **2.1 Introduction**

This section provides an overview of the site-specific factors and analysis that led to the selection of the "no further action" decision for 12 of the 18 CAOCs in OU2, the selection of the preferred alternative for the clean-up of ACM at three of the CAOCs, and the implementation of institutional controls to minimize potential health risks that might be associated with land use changes at three of the CAOCs. The overview includes the following descriptions, histories, summaries, and conclusions:

- A general description of MCAS Yuma location and regional setting.
- A brief history of past operations at MCAS Yuma.
- A brief history of regulatory and enforcement actions for OU2.
- A brief summary of reasons for including specific CAOCs in OU2.
- A summary of characteristics for each CAOC within OU2.
- A summary of target analytes that were considered constituents of potential concern (COPCs) at the CAOCs during the remedial investigation of OU2.
- A summary of the human health risk and ecological risk assessments for the CAOCs within OU2.
- A summary of the selection of "no further action" based on the risk assessment for 12 of the CAOCs within OU2 and the selected remedy for six CAOCs requiring remedial action.
- A description of significant changes to the selected remedy.

These reports are included in the Administrative Record for MCAS Yuma. Much of the information presented in this overview was derived from previous assessments and investigations performed by Southwest Division, Naval Facilities Engineering Command (Navy) and its contractors. Results and conclusions of these assessments and investigations are presented in greater detail in the Initial Assessment Study (Stearns et al, 1985), Confirmation Study Verification Phase (Malcolm Pirnie, 1988), Site Inspection (Malcolm Pirnie, 1990), Asbestos Survey Results (Jacobs Engineering Group, Inc. [JEG], 1995a), Final Remedial Investigation Report (JEG, 1996), Assessment of ACM Contamination (U&A, 1996a), Feasibility Study (U&A, 1996b), and Proposed Plan (U&A, 1996c).

### **2.2 MCAS Yuma Site Location and Description**

MCAS Yuma is located in a desert environment, with mild winters and hot summers. The total annual precipitation in the Yuma area is approximately two to three inches with total potential evapotranspiration exceeding 50 inches (JEG, 1996). MCAS Yuma has installed 51 dry wells that

receive storm water from precipitation events and allow the storm water to infiltrate into the ground. Precipitation events generate small areas of ponded water on the base, but significant quantities of surface water runoff are not generated by precipitation events. Winds are usually light (0 to 6 miles per hour [mph]) to moderate (6 to 16 mph), with an average relative humidity of 20 percent.

The site is located on the northern portion of Yuma Mesa, approximately 60 to 70 feet above the adjacent Colorado River Valley. Sedimentary deposits on Yuma Mesa are predominantly fluvial (river) deposits with minor eolian (windblown) deposits in the upper 180 to 200 feet. These deposits overlie pre-Tertiary bedrock, which crops out in a series of low hills at and around the Station. Geologic materials encountered during previous investigations performed at MCAS Yuma consist of fine to coarse sand with interbeds of clay, silt, and gravel. Local soils are characterized as excessively drained sand with rapid permeability. Groundwater in the vicinity of MCAS flows to the northwest with a gradient of 15 to 20 feet per mile. The groundwater table is typically encountered about 50 feet below ground surface.

No natural surface drainage occurs at MCAS Yuma because of its relatively level topography, low precipitation, and high evaporation. No large surface water bodies are located within the immediate vicinity of MCAS Yuma. The Colorado River, the most significant surface water feature, is located approximately four miles north of MCAS Yuma. Local flooding occurs during storms at the Station, especially in areas where the ground surface is covered with concrete. Minor erosional features, such as gullies and rills, have been noticed near the southwestern end of the runway, as a result of runoff following a storm (JEG, 1996).

Plants and animals within MCAS Yuma are characterized as desert species and species associated with developed areas or species attracted by irrigated areas. No state or federally listed threatened or endangered species are currently known to be present at MCAS Yuma (JEG, 1995b).

### **2.3 MCAS Yuma Installation Operational History**

In early 1928, the U.S. Government leased 640 acres of desert land near the City of Yuma to Yuma County to establish an airfield. The U.S. Bureau of Reclamation (Bureau) leased the airfield to Yuma County to construct a small aircraft hanger and runway in 1937. From 1941 to 1946, the facility was leased to the U.S. Army Air Corps for pilot training and bomber crew training. Field activity ceased with the end of World War II, and the area was returned to the control of the Bureau.

Yuma County obtained rights to use the airfield for civilian purposes from the Bureau in 1948. In July 1951, the U.S. Air Force reactivated the station as a Weapons Proficiency Center for fighter-interceptor units. The Station was declared a permanent Air Force installation in 1954.

In January 1959, the Station and its associated range facilities were transferred to the U.S. Department of the Navy. MCAS Yuma was established in 1959 to provide services and materials support operations to the Marine Aircraft Wing and its subordinate units. MCAS Yuma currently operates the airport facility as a joint military/civilian airport. Since 1959, major improvements have included the construction of a 13,300-foot runway, development of the Instrumented Special Weapons System, and the addition of a Tactical Air Crew Combat Training System.

### **2.4 Enforcement and Regulatory History**

During its 70 years of operation, the Station has generated industrial wastes such as used oil, fuels, solvents, paint residues, battery acid, pesticides, herbicides, and polychlorinated biphenyls (PCBs). In the early years, some of these wastes were disposed of in landfills, burn

pits, and other areas located throughout the Station. Construction and improvement activities also generated construction debris, which has been disposed of in undeveloped portions of the Station.

Remedial investigations were initiated in 1985 to investigate past disposal sites at MCAS Yuma. Early studies indicated the presence of chlorinated solvents in underlying groundwater. As a result, in 1990, MCAS Yuma was placed on the Superfund National Priorities List (NPL). Section 120 of CERCLA requires federal facilities to investigate and clean up past releases of hazardous waste that may pose a risk to human health or the environment.

Investigations performed at MCAS Yuma include the Remedial Investigation/Feasibility Study (RI/FS) (JEG, 1996), supplemental sampling programs at CAOC 10 (Uribe, 1996d; Uribe, 1997), Federal Facility Agreement Assessment Program (FFAAP) (Stearns, 1985), and underground storage tank investigations (JEG, 1995b).

In 1990, shortly following MCAS Yuma's listing on the NPL list, the Navy entered into a FFA with U.S. EPA and ADEQ to establish a framework and schedule for implementing environmental investigations and appropriate cleanup actions. The Final FFA was signed in January, 1992. The Navy and regulatory agencies agreed to subdivide the Station into two Operable Units (OUs), one to address potential areas of groundwater contamination and soil contamination deeper than 10 feet below ground surface (OU1) and one for soil contamination shallower than 10 feet below ground surface (OU2). OU1 will be addressed by a separate ROD following completion of the investigative process.

The Navy is the lead agency under the NCP for conducting investigation and remediation of MCAS Yuma pursuant to CERCLA. This process is conducted in consultation with U.S. EPA, as the lead regulatory agency, and with ADEQ, as the supporting state regulatory agency for these activities. There have been no enforcement actions for OU2.

## **2.5 Operable Unit 2 Site Selection History**

OU2 consists of surface disposal and disposal units within the upper 10 feet of soil underlying the Station, where disposal or releases of petroleum products, paints, solvents, metals, pesticides, and other process chemicals may have occurred. Contamination of groundwater underlying the Station and soils greater than 10 feet below the ground surface are addressed by the Installation Restoration Program (IRP) for OU1. The objectives of the OU2 environmental restoration program are to evaluate the environmental condition of the CERCLA areas of concern (CAOCs); identify threats to human health, the environment, and groundwater quality; and develop cleanup actions to protect human health and the environment. Based on the human health and environmental risk assessments, the RI recommended no remedial action for 12 of the 18 CAOCs in OU2. ACM was identified at three of the 18 CAOCs, and these CAOCs are the only CAOCs that require remediation within OU2. In addition, institutional controls will be implemented for CAOCs 1, 8, and 10 to minimize potential health risks that might be associated with land use changes at these CAOCs.

Based on the results of preliminary investigations, the RI was conducted at the following CAOCs within OU2 at MCAS Yuma:

- CAOC 1, Flight Line
- CAOC 2, Shops Area
- CAOC 3, Auto Hobby Shop
- CAOC 4, Radar Hill Disposal Area
- CAOC 5, Old 2nd LAAMBN Compound
- CAOC 6, First Sewage Lagoon

- CAOC 7, Fire School Area
- CAOC 8, Southeast Station Landfill
- CAOC 9, Southeast Sewage Lagoon
- CAOC 10, Ordnance Munitions Disposal Area
- CAOC 11, Radiation Disposal Pile
- CAOC 12, Tear Gas Burial Area
- CAOC 13, Drain Field Area
- CAOC 14, Lagoon South of Building 97
- CAOC 15, Hazardous Waste USTs 363 and 364
- CAOC 16, Hazardous Waste USTs 230-2 and 230-4
- CAOC 17, Hazardous Waste Underground Storage Tank 1708-3
- CAOC 18, Old Drum Storage Area

The RI was conducted in 1995 and included an assessment of each CAOC. RI activities included a surface reconnaissance and historic information search, aerial photography review, interviews with former employees and personnel stationed at the base, geophysical surveys (to look for buried tanks, drums, or other underground objects that might contain hazardous substances), surface and subsurface soil sampling, soil gas surveys (to look for hazardous substances that might have vaporized in soils), and human health and ecological risk assessments. The results of the RI are presented in the document titled Marine Corps Air Station, Yuma, Arizona, Operable Unit 2, Remedial Investigation, Final Report, dated March 26, 1996, prepared by Jacobs Engineering Group, Inc. (JEG, 1996). The RI, along with reports of previous assessments and investigations, are contained in the Administrative Record.

## **2.6 Operable Unit 2 Site Descriptions**

### **2.6.1 Introduction**

The location of the 18 CAOCs investigated under the RI are shown on Figure 1-2. CAOC-specific figures are provided in Figures 2-1 through 2-10 for the six CAOCs at which remedial actions are required. A brief description of the facilities, past operations, and potential sources of contaminants is provided in the following paragraphs. Because groundwater issues are included in the IRP for OU1 and surface water is not present at MCAS Yuma, potential pathways for released contaminants are limited to contact with site soils, site-derived soil dusts, or site-derived soil vapors.

### **2.6.2 CAOC 1: Flight Line**

CAOC 1 consists of the pre-1960 flight line (runways, aprons, and taxiways) and associated aircraft maintenance/hangar facilities (Figure 2-1). This CAOC is located in the north-central portion of MCAS Yuma and occupies approximately 170 acres. Used oils were frequently drained from aircraft engines directly onto the ground surface beneath parked aircraft. Used oil was also used routinely for dust control around hangars, runways, taxi ways, and apron edges.

The primary finding of the field sampling and analysis program was the widespread detection of Total Recoverable Petroleum Hydrocarbons (TRPH) in surface soil and localized occurrences around the flight line. Polycyclic Aromatic Hydrocarbons (PAHs) were detected in surface soil. Polychlorinated biphenyls (PCBs, often formerly used for the lubrication of electric transformers) were detected in surface soil at the northern edge of the flight line and current wash rack. Solvents (volatile organic compounds and semi-volatile organic compounds), pesticides, and metals were detected in shallow soil samples collected throughout the area. The results of the investigation did not reveal significant soil contamination in the areas of the specific units (drywells, oil/water separators, wash racks, etc.) included in this study. PAHs were the major COPC posing a potentially unacceptable health risk in CAOC 1. Total PAH

concentrations are summarized in Figures 2-2 and 2-3.

#### **2.6.3 CAOC 2: Shop Areas**

CAOC 2 consists of the area bounded by Worley Street on the south, Building 603 on the west, Shaw Avenue on the east, and the flight line and Fuel Farm area on the north. It is located within the northeastern portion of the industrial area of MCAS Yuma and occupies approximately 28 acres. This area was used between the 1940s and the early 1980s for public works shops and vehicle maintenance. Various chemical spills and disposals onto the ground surface were reported throughout this area between the 1940s and 1980s. In addition, two underground fuel storage tanks were found to be leaking and were replaced. Suspected waste streams associated with this area include used oils, fuel-related wastes, used paints, solvents, and vehicle-related wastes.

The primary finding of the field sampling and analysis program was the isolated detection of residual TRPH and PAHs. Pesticides, Total Petroleum Hydrocarbons (TPH) as diesel, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, and organic lead were also detected. The results of the investigation did not reveal significant soil contamination in the areas of the specific units (drywells, oil/water separators, former buildings, etc.) included in RI field investigation.

#### **2.6.4 CAOC 3: Auto Hobby Shop**

CAOC 3 consists of an open area adjacent to the Auto Hobby Shop (Building 561) at the southeast corner of Quilter Street and Halstead Avenue. The original fenced area of CAOC 3 covered approximately 0.3 acres of unpaved land. The ground surface outside the Auto Hobby Shop was reportedly used for the disposal of motor oil, cleaning solvents, battery acid, and anti-freeze between 1960 and the early 1980s. Stoddard solvent, commonly used to clean shop floors and automotive parts, was also likely to have been disposed of within this area.

The primary finding of the field sampling and analysis program was the detection of residual TRPH in the shallow soils underlying this area. However, no individual components of TRPH, such as benzene, toluene, ethylbenzene, and total xylenes (BTEX), were detected. Significant concentrations of other analytes were not detected.

#### **2.6.5 CAOC 4: Radar Hill Disposal Area**

CAOC 4, comprising approximately 14 acres, is located south of Radar Hill within the central portion of MCAS Yuma (Figure 2-4). This area was used for burning or burying municipal waste (household waste) generated at MCAS Yuma and, more recently, for the disposal of construction debris, including broken concrete slabs. Sometime during the 1950s, this area was covered with soil. Suspected waste streams associated with this area include used oils, used paints, solvents, thinners, vehicle-related wastes, pesticides, and herbicides.

The primary findings of the field sampling and analysis program were the detection of residual TRPH and the isolated detection of PAHs and lead. Organics and metals were also found in the shallow soils underlying this area. No individual components of TRPH, such as BTEX, were found. The surface soil samples collected from CAOC 4 did not contain detectable asbestos. However, during the field sampling program, several debris piles were identified in which potential ACM was noted. Subsequent analysis of these materials confirmed the materials to be ACM (JEG, 1996).

#### **2.6.6 CAOC 5: Old 2nd LAAMBN Compound**

CAOC 5, occupying approximately two-thirds of an acre, is located within the south-central



portion of MCAS Yuma, south of Loesch Road between Baseball Field 1268 and the residential housing area. This CAOC was the site of the 2nd Light Anti-Aircraft Missile Battalion (LAAMBN) vehicle maintenance and storage yard between the late 1960s and 1974. Routine vehicle servicing, maintenance, and fueling operations have occurred within this area and have resulted in the disposal and spills of fuel, motor oil, and solvents. In addition, used motor oil, transmission fluid, cleaning and degreasing solvents (trichloroethene, trichloroethane, and Stoddard solvent), antifreeze (ethylene glycol), and neutralized battery acid were sprayed along the exposed soil ground surface for dust control purposes.

The primary finding of the field sampling and analysis program was the detection of residual TRPH. However, no individual components of TRPH, such as BTEX, were detected. Pesticides, TPH as diesel, VOCs, SVOCs, and metals were also detected.

#### **2.6.7 CAOC 6: First Sewage Lagoon**

CAOC 6 is located west of County Road 3E and south of Loesch Street in an area currently used for military family housing. This area encompasses approximately 30 acres. Treated industrial sewage and municipal sewage (domestic sewage) from MCAS Yuma was discharged into an unlined evaporation/infiltration lagoon and sludge beds during the early 1940s. The sewage treatment facility ceased operations in 1943 and was covered. The sludge was also buried in place at that time, and in the 1970s, a housing development was constructed on top of the buried lagoon and sludge beds. Suspected waste streams associated with this area include vehicle-related wastes, used oils, solvents, thinners, paints, caustics, photo processing wastes, herbicides, and pesticides.

The primary finding of the field sampling and analysis program was the detection of residual TRPH. However, no individual components of TRPH, such as BTEX, were detected. Solvents, pesticides and metals were also found in the shallow soils underlying this area.

#### **2.6.8 CAOC 7: Fire School Area**

CAOC 7 is divided into two subunits: CAOC 7A (northern unit) and CAOC 7B (southern unit). CAOC 7A, occupying approximately 40 acres, is located southwest of Radar Hill and north/northwest of the Combat Aircraft Loading Apron (CALA) (Figure 2-5). CAOC 7B consists of several small debris piles located south of the CALA (Figure 2-6). During the RI field investigation, only CAOC 7A was investigated. CAOC 7B was investigated subsequently in an investigation documented in MCAS Yuma - Asbestos Survey Results (JEG, 1995a).

CAOC 7A consists of 16 unlined fire pits that were used between 1952 and 1985 for fire training. The current lined fire pit (Facility 1220) has been used since 1985. There are seven former fuel bladder areas that were used between approximately 1967 and 1984. Fires at CAOC 7A were created by floating flammables on water in shallow, unlined pits. The fuel in the fire pit was ignited, and trainees extinguished the fire. Water and unburned flammables were washed into the surrounding soil and left to infiltrate. Suspected waste streams associated with this area include aviation fuels, used oils, solvents, and thinners.

The primary finding of the field sampling and analysis program in CAOC 7A was the widespread detection of residual TRPH, generally in former fire pits and fuel bladders. Low concentrations of VOCs, SVOCs, PCBs, pesticides, dioxins/furans, TPH as diesel, and metals were also detected.

Small broken pieces of asbestos-containing materials were identified south and east of the active fire-training pit. The area contaminated with ACM is approximately 170,000 square feet. Over most of the unit, the ACM occurs only as surface scatter. In a limited area near the active burn pit, the ACM contamination reaches a maximum of one foot deep (up to 1,200 cubic

yards). The RI (JEG, 1996) concluded that asbestos is the only COPC at CAOC 7A that may pose a risk to human health or the environment.

CAOC 7B consists of debris piles south of CALA: The area immediately south of CALA has been used for dumping construction debris. Seven sites within this area were confirmed to contain ACM debris. These sites consist of isolated, coherent piles (in one case, a single piece) containing one or more of the following types of ACM: floor tile with asbestos-containing mastic, transite, and/or ACM pipe. The total volume of ACM debris is approximately 10 cubic yards (JEG, 1995a).

#### **2.6.9 CAOC 8: Southeast Station Landfill**

CAOC 8 is located within the southeastern portion of MCAS Yuma, between Loesch Street and the southern Station property lines. This area was subdivided into two units: CAOC 8A (southern unit) and CAOC 8B (northern unit) (Figure 2-7). CAOC 8A includes a landfill that was used to dispose of waste generated at MCAS Yuma, and CAOC 8B, includes the housing development that now covers the area north of Ordnance Road. Combined, CAOCs 8A and 8B occupy approximately 68 acres. This area was used primarily for the disposal of municipal wastes that were generated at MCAS Yuma between 1953 and 1961. Before disposal, most of the wastes were burned. During disposal, approximately 10 to 20 pits were used for the burial of wastes. A portion of the area was used for rubble disposal and as a borrow area for fill soil. At an unknown date, the pits were backfilled, and housing units were developed. Suspected waste streams associated with this area include vehicle-related wastes, used oils, solvents, thinners, paints, fuel-related wastes, pesticides, and herbicides.

Drilling within the landfill was not performed because of potential drilling hazards and difficult drilling conditions caused by construction debris buried in the landfill. Therefore, the landfill investigation was directed at evaluating the exposure scenario for the present site conditions and future (capped) conditions.

The primary findings of the field sampling and analysis program were the detection of residual TRPH, PAHs, PCBs, solvents, pesticides, and metals in the shallow soils underlying this area. These contaminants were generally found in the portion of the CAOC south of North Ordnance Road. Low levels of trichloroethene, tetrachloroethene, xylenes, and methane were also detected in soil gas samples. PCBs were the major COPC posing a potentially unacceptable health risk for current land uses at CAOC 8A.

#### **2.6.10 CAOC 9: Southeast Sewage Lagoon**

CAOC 9 is located within the southeast corner of MCAS Yuma, southwest of the intersection of North Ordnance Road and County Highway 3E (Figure 2-8). This CAOC formerly consisted of two Imhoff tanks, sludge drying beds, and six lagoons occupying approximately 14 acres. This area was used for wastewater treatment between 1944 and 1970, when the Station began discharging to the Yuma wastewater treatment plant. The sewage lagoons were unlined. Periodically, the sludge beds were scraped for cleaning. The lagoons were closed in 1970. The sludge was left in place and covered with fill materials. Suspected waste streams associated with this area include used oils, used paints, solvents, thinners, and photograph processing waste.

The primary findings were the detection of residual TRPH in near-surface soil and the isolated detection of PAHs. Metals detected above RBC at CAOC 9 were antimony, arsenic, and lead, but the RI (JEG, 1996) concluded that the elevated metal concentrations detected in the samples were anomalous and were not representative of concentrations at the CAOC.

Asbestos was not detected in the surface soil samples. However, asbestos was detected in

samples from one debris pile north of the horse stables within the CAOC. The RI (JEG, 1996) concluded that the asbestos at CAOC 9 was the only COPC that may pose a risk to human health or the environment.

#### **2.6.11 CAOC 10: Ordnance Munitions Disposal Area**

CAOC 10 was used during World War II as a shooting range for bomber gun crews (Figure 2-9). Since the early 1950s, ordnance materials have been stored in magazines around the central portion of Ordnance Loop Road. The area has also been used for surface tank and drum storage. Surface spills have been reported within this area. This area continues to be used for the storage and handling of ordnance. Suspected waste streams associated with this area include used oils, ordnance waste associated with nitroaromatics, fuel-related wastes, and metals.

The primary finding of the field sampling and analysis program was the detection of TRPH, PAHs, and one anomalous lead concentration in surface soil. PAHs were detected in surface soil at four locations during the RI. Follow-up sampling programs in August 1996 and February 1997 (U&A, 1996d; U&A, 1997) demonstrated the presence of PAHs over a wider area than indicated by the RI. Several sampling locations had total PAH concentrations an order of magnitude higher than were detected in the RI. Figure 2-10 shows the total PAH concentrations detected in the August 1996 and February 1997 samples with the isoconcentration contours defined in the RI Report. Although the August 1996 and February 1997 data support the presence of elevated PAH concentrations at the four areas of elevated PAHs identified in the RI Report, the later data also indicate that elevated PAH concentrations are present at locations that do not correspond to features identified based on aerial photographs or geophysical anomalies.

#### **2.6.12 CAOC 11: Radiation Disposal Pipes**

CAOC 11 is located near the south-central boundary of MCAS Yuma, south of CAOC 10 and west of CAOC 8. During Air Force operations (between 1951 and 1959), two sealed iron pipes containing radioactive material (electron tubes, luminous markers, radium dials, and radium knobs) were buried at this location. The pipes were examined in April 1980 and subsequently removed and disposed of off Station. Swipe tests on each pipe indicated the presence of radium 226 at less than one microcurie (JEG, 1996). Soil samples from the burial pit were analyzed and compared to soil from 20 to 200 feet away. No signs of residual radiation were found in the soil. Because radiological contamination was not detected during the radiological characterization survey, the RI concluded that additional soil sampling was not necessary.

#### **2.6.13 CAOC 12: Tear Gas Burial Area**

CAOC 12 is located within the southwestern portion of the Station, approximately 550 feet northwest of Building 1597 on the southern edge of the Combat Aircraft Loading Apron (CALA). This area comprises approximately 0.4 acre. The Marine Wing Weapons Unit (MWWU) was constructed in 1962, at which time this area consisted of an unpaved road that led to the MWWU. Between 1977 and 1978, 300 pounds of dry crystal tear gas were reported to have been buried at this site. Oil was also reported to have been sprayed across the surface of this area for dust control purposes. This area was graded in late 1984 when the CALA was constructed; no tear gas bags were revealed. The bags may be buried deeper than the soils excavated during grading activities or the contents may have been mixed with the soil. Suspected waste streams in this area include tear gas waste (including solvents) and trihalomethanes. Two VOCs, methylene chloride and toluene, and three SVOCs were detected in soil samples; all detected values were below RBC values (See Section 2.10.5). The RI found no evidence of tear gas wastes at this CAOC.

#### **2.6.14 CAOC 13: Drain Field Area**

CAOC 13 consists of the drain field that was formerly used for the MWWU compound when it was located at the end of Hamilton Street. This drain field is beneath the 14-inch-thick concrete at CALA, which is located within the southwestern portion of the center of MCAS Yuma, approximately 500 feet northwest of Building 1597. This area covers approximately two acres of land. The MWWU compound was constructed in 1962 and operated until 1984, when it was replaced by CALA. Liquid rinsates from filling and mixing equipment used for simulated chemical weapons (tear gas and napalm) at the MWWU were disposed of at a drain field south of former Building 1585. An estimated one million gallons of wastewater were discharged to the drain field between 1970 to 1985. Suspected waste streams associated with this CAOC include used oils, fuel-related wastes, solvents, and thinners. PAHs, pesticides, and metals were detected within the shallow soils beneath this area.

#### **2.6.15 CAOC 14: Drain Field South of Building 97**

CAOC 14 is located north of Building 40 and south of Building 97, comprising an area of approximately one acre. A lagoon south of Building 97 has been used for the collection of surface stormwater runoff since 1955. In 1985, another lagoon area was constructed northwest of Building 40; in 1989, the lagoon was extended to the northeast. These pit configurations currently direct stormwater to the area northwest of Building 40. Suspected waste streams within this area include used oils, fuel-related waste, solvents, and thinners.

The primary finding of the field sampling and analysis program was the detection of residual TRPH and isolated PAHs. However, no individual components of TRPH, such as BTEX, were detected. Solvents, pesticides, PCBs, and metals were also detected in the shallow soils beneath this area.

#### **2.6.16 CAOC 15: Hazardous Waste USTs 363 and 364**

CAOC 15 is located at the Fuel Farm within the northeastern corner of MCAS Yuma, east of the flight line. This area, which occupies approximately 0.3 acre, formerly contained two underground storage tanks (USTs). The USTs were installed in 1943 and removed in 1987, after they failed a leak test. Suspected waste streams within this area include used oils, fuel-related waste, used paints, solvents, and thinners. Hydrocarbons, solvents, and metals have been detected in the shallow soils underlying this area.

#### **2.6.17 CAOC 16: Hazardous Waste USTs, Building 230-2 and 230-4**

CAOC 16 is located within the northeastern corner of the flight line, adjacent to Building 230, the Airframe Shop. Both tanks were removed in 1989. Tank 230-2 was reported to be leaking, and tank 230-4 failed a leak test. Suspected waste streams in this area include used paints, solvents, and thinners.

The sampling and analysis of soil samples detected residual TRPH concentrations. However, no individual components of TRPH, such as BTEX, were detected. Trichloroethene (in one sample only), SVOCs and metals were also detected. Metals were all within background levels.

#### **2.6.18 CAOC 17: Hazardous Waste Underground Storage Tank 1708-3**

CAOC 17 is the former location of a UST adjacent to Building 1708 within the southwest portion of MCAS Yuma. The UST was installed in 1985 to collect rinsate from the decontamination pad adjacent to Building 1708. The tank was abandoned in 1988 and removed in 1995. At the time the UST was removed, three soil samples were collected beneath the tank for laboratory analysis. The analytical results did not reveal the presence of TRPH or halogenated VOCs, indicating that a past release from the tank had not occurred. Waste streams associated with this area include

used oils, fuel-related waste, solvents, thinners, and vehicle-related waste.

The primary finding of the field sampling and analysis program was the detection of residual TRPH. However, no individual components of TRPH, such as BTEX, were detected. In addition, SVOCs, pesticides, and metals were detected, but the metals were within background ranges.

#### **2.6.19 CAOC 18: Old Drum Storage Area**

CAOC 18, comprising approximately 0.45 acres, is located within the northeastern corner of MCAS Yuma, north of the Fuel Farm. Approximately 102 55-gallon drums were stored within a fenced area between 1987 and 1989. The drums, which contained investigation-derived wastes and waste personnel protective equipment, were removed and crushed in 1990, and the area is currently vacant. No historical information suggests the storage of waste within this area before 1987. Suspected waste streams include used oils, fuel-related waste, used paints, solvents, thinners, vehicle-related wastes, photo processing waste, and nitroaromatics.

The primary finding of the field sampling and analysis program was the detection of residual TRPH and isolated PAHs. However, no individual components of TRPH, such as BTEX, were detected. Solvents, pesticides, and metals have also been detected at isolated locations in the shallow soils underlying this area.

#### **2.7 Highlights of Community Participation**

The Community Relations Program was designed and implemented in accordance with the Community Relations Plan (JEG, 1994a). This program is intended to both inform the public and to provide the public with opportunities to participate in the decision-making process for environmental cleanup at the Station. A Restoration Advisory Board (RAB), comprising representatives from the Navy, U.S. EPA, the Arizona Department of Environmental Quality, and members of the general public, has been established and meets periodically to involve the public in decisions regarding investigation results, proposed work, and potential remedial options. The Navy has also presented RI plans and results at public meetings conducted on January 18 and April 11, 1996.

The Navy has prepared a Proposed Plan for OU2 at MCAS Yuma for public review and comment. The plan was presented on March 20, 1997. The Proposed Plan summarizes information collected during the OU2 Preliminary Assessment/Site Inspection (PA/SI) and Remedial Investigation/Feasibility Study (RI/FS) and other documents that are available at the local repositories.

Comments regarding the Proposed Plan were accepted during a 30-day public review and comment period that extended from March 21, 1997 to April 28, 1997. A public meeting was held on April 9, 1997, to provide the community an opportunity to ask questions and express concerns about the Plan. Responses to comments received during the public comment period are included in the Responsiveness Summary (Section 3) of this ROD. The public comment period is a continuation of the Navy's commitment to community involvement in the MCAS Yuma IRP and is required by CERCLA.

#### **2.8 Scope and Role of Operable Unit 2**

Response actions for MCAS Yuma are addressed as Operable Units (OUs). Two OUs have been identified at MCAS Yuma. OU1 addresses contamination of groundwater and soils greater than 10 feet below the ground surface. OU2 consists of surface disposal and disposal units within the upper 10 feet of soil underlying the Station, where disposal or releases of petroleum products, paints, solvents, metals, pesticides, and other process chemicals may have occurred. OU2 is limited to depths of 10 feet because this is the maximum likely depth for footings associated with any new construction at MCAS Yuma. This ROD documents the remedial action plan for OU2. Remedial objectives and goals for OU1 will be addressed in a separate ROD.

The OU2 IRP has the following objectives:

- Evaluate the environmental condition of the CAOCs
- Identify potential threats to human health or the environment
- Develop cleanup actions to protect human health and the environment

The RI investigated 18 CAOCs at which surface or near-surface disposal or releases of wastes may have occurred. The investigation of OU2 was limited to an assessment of the risk/hazard posed by contaminants in the upper 10 feet of soil. No risk to the environment was identified at the 18 CAOCs (See Section 2.11). Based on the human health risk assessments summarized in Section 2.10, 15 of the 18 CAOCs are acceptable for residential land use, while chemicals identified at CAOCs 1 and 10 present acceptable health risks if their current, non-residential land uses are maintained. Since the chemical contents of CAOC 8A (the inactive Southeast Station Landfill) are not known, activities that disturbed the interior of the landfill would have an unknown impact on human health risks. Institutional controls will be implemented for CAOCs 1, 8A, and 10 to minimize potential health risks that might be associated with land use changes at these CAOCs.

ACM, which was not included in the quantitative risk assessments because risk criteria have not been established for asbestos, was identified in three of the 15 CAOCs that were assessed to be otherwise acceptable for residential land use. The ACM at these three CAOCs (4,7, and 9) is the only material within OU2 for which remedial actions are recommended.

No remedial action is recommended for the 12 CAOCs that are acceptable for residential land use and have no identified ACM. Although these areas do not present human health risks or ecological risks, they are still referred to as CAOCs (CERCLA Areas of Concern) in this document because, although the term "CAOC" is used to identify a potentially hazardous site, a CAOC is not necessarily a site that requires remediation.

## **2.9 Summary of Field Investigation**

The field sampling effort was preceded by extensive scoping activities that included a records search, personnel interviews, an aerial infrared thermographic survey, and acquisition and interpretation of aerial photographs. Information was also obtained from geophysical subsurface surveys (magnetic and electromagnetic) that identified anomalies at several CAOCs. Geophysical surveys were performed at CAOCs 4,8,9,10,14,16, and 17.

Based on past and current activities at the CAOCs, several potential waste streams were identified, including lubricating oils, fuel products, paints and waste paints, solvents and thinners, vehicle-related wastes, photographic processing materials, pesticides, and herbicides. These waste streams were used as the primary basis in the selection of chemicals of potential concern (COPC at each CAOC. COPCs are listed in Table 2-1.

The RI field investigation program included soil gas surveys and soil sample collection and analyses. Analyses for COPCs were performed at an off-site and an on-site laboratory. The on-site laboratory provided data that were used for rapid soil screening, while the off-site laboratory data were used in the risk assessments for the CAOCs. Narrative summaries of the primary findings of the field investigation for each of the 18 CAOCs in OU2 are included in Sections 2.6.2 through 2.6.19.

Tables 2-2 through 2-5 summarize maximum concentrations of volatiles, semivolatiles, pesticides, and metals detected in samples submitted to the off-site laboratory at each CAOC, as well as the RBC values calculated for each COPC (Section 2.10.5). Off-site data are summarized in these tables because only off-site data were used in the human health risk assessment. Samples

submitted for off-site analysis consisted of confirmatory splits of samples analyzed by the on-site laboratory and samples collected from suspected "hot spots". Hot spots are localized regions where COPC concentrations exceed risk based criteria (See Section 2.10.5). Table 2-5 also includes the CAOC-specific background levels (or TLV values) for the metals. An evaluation of potential human health and ecological risks is presented in Sections 2.10 and 2.11.

## **2.10 Summary of Risk Assessment**

### **2.10.1 Human Health Risk Assessment**

Human health risk assessments were performed on a site-by-site basis for the 18 CAOCs within OU2. A detailed discussion of the risk assessment procedures is presented in Section 4.16 and Appendix P of the RI Report (JEG, 1996). Results of the risk assessment are included in the site-by-site discussions in Sections 6 through 22 of the RI Report. The human health risk assessment includes the identification of the COPCs, exposure assessment, toxicity assessment, and the development of risk-based concentrations (RBC). The individual components of the risk assessment process are described below.

#### **2.10.2 Identification of COPCs**

The COPCs included in the risk assessment process included target analytes that were detected during the field sampling for OU2. Table 2-1 presents the target analytes that constituted potential COPCs. Note that asbestos was not included in the quantitative risk assessment because there are no established risk criteria for asbestos. The criteria for exclusion of a detected analyte from risk-based screening are given below:

- Metals that are essential human nutrients. These metals include calcium, iron, magnesium, potassium, and sodium.
- Metals that did not exceed local background values; these background values were expressed as threshold limit values (TLVs).
- Analyte concentrations less than 10 times those detected in the method blank for common laboratory contaminants. Analytes, considered common laboratory contaminants include acetone, methylene chloride, and phthalates. The exclusion criteria stipulated are consistent with U.S. EPA recommended procedures (U.S. EPA, 1992a).
- Analytes that have no published toxicity data available (i.e., cancer potency factors or reference doses as published in the Integrated Risk Information System (IRIS) and the Health Effects Assessment Summary Table (HEAST)).
- Analytes detected at sampling depths greater than 10 feet.
- Unquantified compounds (e.g., unknown ketones).

Threshold limit values (TLVs) were calculated for all CAOC-specific metals data using an U.S. EPA-approved method (U.S. EPA 1989a) that determines how many standard deviations from the mean are required to have 95 percent confidence that the upper threshold of a normal population is at the 95th percentile. The TLV method uses a K-factor that is inversely related to the size of the population data set (i.e., as the population size increases the K-factor decreases). TLV values for the individual CAOCs are included in Table 2-5.

The maximum concentrations from the off-site laboratory samples taken at hot spot and confirmatory splits from the upper five feet of soil were evaluated in the ecological risk assessment; those from the upper 10 feet of soil were evaluated for the human health risk assessment. Risk assessments were not performed for CAOC 11 or CAOC 15. At CAOC 11, soil samples were not collected, because only a radiological survey was performed. At CAOC 15, soil samples were only collected from depths greater than 10 feet, because the investigation was focused on a UST buried beneath this depth.

### **2.10.3 Exposure Assessment**

Exposure is the contact of a receptor (human or ecological) with a chemical or physical agent. Exposure magnitude is determined by estimating the amount of the contaminant (analyte) available at the exchange boundary (skin, lungs) during a specified period of time. Exposure assessment is the determination of the magnitude, frequency, duration, and pathway and route of exposure. The RI exposures were assessed for reasonable maximum exposure (RME) scenarios, which represent an upper-bound conservative exposure that is within the range of possible exposures. If the receptor is exposed via more than one route (e.g., dermal contact, inhalation, etc.), the combination of exposures across all relevant routes must also represent an RME.

Because groundwater issues are included in the IRP for OU1, and surface water is not present at MCAS Yuma, potential pathways for released contaminants are limited to the following:

- Incidental ingestion of soil contaminants
- Dermal contact with soil contaminants
- Inhalation of volatile emissions from soil
- Inhalation of suspended soil particulates

Exposure scenarios were developed for both current and future land uses at MCAS Yuma. Because the future land use scenarios involve a higher degree of exposure to chemicals at MCAS Yuma, risk management decisions were made on the basis of the future use scenarios. Use of the future use scenarios, therefore, provided a more conservative estimate of risk.

Exposure scenarios for current uses at MCAS Yuma included the following: military workers, for the CAOCs that are currently industrial/commercial; and military children, for those CAOCs in close proximity to base housing. For both of these scenarios, the risk assessment used an exposure duration of three years, which was considered to be an upper bound of the typical duty assignment at MCAS Yuma (JEG, 1996).

Future use scenarios were developed assuming that MCAS Yuma was no longer operative and the property would be re-developed for either residential housing, industrial/commercial, or agricultural activities. RME exposure scenarios were evaluated in terms of either an industrial/commercial scenario or a residential scenario; these two scenarios provided more significant exposure than the agricultural exposure scenario. The RME future use scenarios used standard U.S. EPA-approved default exposure parameters. In particular, the residential exposure scenario used in the assessment is not representative of base housing, but is based on future residential land use and represents an RME scenario of a 30- year lifetime exposure. Similarly, the industrial exposure scenario for future use includes a 25-year exposure period, rather than the three-year exposure period for military workers. Both residential and industrial/commercial exposure scenarios were used for all CAOCs, although only CAOCs 4,6, and 8 are actually located at, or adjacent to, residential housing. RBC values in Tables 2-2 through 2-5 are for the future use scenarios, because these represent the most conservative RBC values.

Note that the Arizona Health Based Guidance Levels (HBGL) discussed in the ARAR discussion in Section 2.13.4 are derived using the assumption that incidental ingestion of soil contaminants is the only significant exposure pathway. Therefore, the RBC values (See Section 2.10.5) are more conservative than the HBGL values. HBGL values are derived by ADEQ for residential and non-residential scenarios that are analogous to the future use industrial/commercial and residential scenarios used in developing RBC values.

### **2.10.4 Toxicity Assessment**

Exposure to the identified constituents of concern may, in sufficient concentrations, adversely



effect human health. Therefore, U.S. EPA has developed Cancer Potency Factors and Reference Doses to evaluate potential toxicity.

Cancer potency factors (CPFs) have been developed by U.S. EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of (mg/kg-day)<sup>-1</sup>, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of (1) human epidemiological studies or (2) chronic animal bioassays to which animal-to-human extrapolations and uncertainty factors have been applied to account for the use of animal data to predict the effects on humans.

Reference doses (RfDs) have been developed by U.S. EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of chemical incidentally ingested with soil) can be compared to the RfD. RfDs are derived from (1) human epidemiological studies or (2) animal studies to which uncertainty factors have been applied to account for the use of animal data to predict the effects on humans. These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

#### **2.10.5 Development of Risk-Based Criteria**

Risk-based criteria (RBC) are chemical-specific concentrations for a given set of exposure assumptions (e.g., residential, military worker) and for a particular medium (e.g., soil). For the OU2 RI, COPCs in soil were the only evaluated medium (Note: This medium includes volatilization of organics from soil).

The maximum COPC values at each CAOC were compared to RBC. These RBC values are functions of the inherent toxicity of the individual COPC and the default exposure parameters for each of the evaluated exposure scenarios. Consequently, different RBC values were derived for each exposure scenario that was considered probable at MCAS Yuma. The algorithms and the description of the methodology used to calculate RBC are presented in Appendix P of the RI (JEG, 1996).

RBC for carcinogenic compounds were calculated by inserting the appropriate exposure parameters and toxicity values into the chemical intake equation, and setting the target cancer risk summed over all probable pathways equal to  $10^{-6}$ . The  $10^{-6}$  risk level is considered de minimus; a risk level exceeding  $10^{-4}$  is the level that generally warrants action at a site. An excess lifetime cancer risk of  $1 \times 10^{-6}$  indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site. RBC values for noncarcinogenic effects were calculated similarly with the target noncarcinogenic hazard index (HI) set equal to 1.0. An HI equal to or less than 1.0 identifies a level of exposure to the chemical at which even sensitive populations are unlikely to experience adverse health effects. For chemicals with both carcinogenic and noncarcinogenic health effects, RBC values were determined for each of these health effects.

Note that the Arizona Health Based Guidance Levels (HBGL) discussed in the ARAR discussion in Section 2.13.4 are derived using a target cancer risk of  $1 \times 10^{-6}$  for carcinogens and a HI of 1.0 for noncarcinogens.

RBC were used to evaluate cumulative cancer risk and/or non-cancer hazard at each CAOC. Selected samples (10 percent splits) from the on-site samples were sent to an off-site laboratory for analysis. The maximum soil concentration detected at the off-site laboratory for each analyte detected at the CAOC was compared to the cancer and/or noncancer RBC for that analyte. Risk quotients were calculated by dividing the maximum concentration of the analyte by the applicable RBC for carcinogenic compounds. For carcinogens, a risk quotient of 1 is equivalent to a cancer risk of  $10^{-6}$ , while a risk quotient of 10 is equivalent to a cancer risk of  $10^{-5}$ . Hazard quotients for non-carcinogenic COPCs were calculated similarly. The carcinogenic and non-carcinogenic quotients for each analyte were then each summed to provide CAOC-specific cumulative indices.

## **2.10.6 Summary of Risks at Individual CAOCs**

### **Introduction**

Health risks were calculated for OU2 on a CAOC-by-CAOC basis. For each CAOC, risks were calculated for both residential and industrial use scenarios. The RBC values and maximum COPC values that were used for each CAOC-specific risk assessment are included in Tables 2-2 through 2-5. Calculated excess lifetime cancer risks are within the range of acceptable risk defined by the U.S. EPA ( $10^{-6}$  to  $10^{-4}$ ) (U.S. EPA 1994c) for current land uses. However, as discussed below, excess cancer risks for unrestricted land use (residential) may be higher than acceptable at CAOCs 1 and 10. The calculated excess cancer risks for these two CAOCs are discussed below. Since the chemical contents of CAOC 8A (the inactive Southeast Station Landfill) are not known, potential cancer risks associated with exposure to the landfill interior are not known. Based on the RI, U.S. EPA, ADEQ, and the Navy concluded that HI values were acceptable for residential exposure at 16 of the CAOCs and that HI values were acceptable for

industrial exposure at the remaining CAOCs, 1 and 10. The following discussion focuses on cancer risk at CAOCs 1, 8A, and 10.

### **CAOC 1: Flight Line**

The excess cancer risk for CAOC 1 is  $6.48 \times 10^{-5}$  for the commercial/industrial exposure scenario. Approximately 90 percent of the excess CAOC cancer risk is attributable to PAHs, 4 percent to PCBs, 2 percent to pesticides, and 4 percent to metals. The RI concluded that the 0- to 10-foot soils at CAOC 1 do not pose an unacceptable risk to human health under the commercial/industrial use scenario, which coincides with the current use of the CAOC (JEG, 1996).

For a residential exposure scenario, the calculated excess lifetime cancer risk is  $2.19 \times 10^{-4}$ , 83 percent of which is attributable to PAHs. The excess lifetime cancer risk at CAOC 1 is greater than the acceptable range for an unrestricted residential use scenario.

### **CAOC 8A: Southeast Station Landfill South of North Ordnance Road.**

The portion of CAOC 8 south of North Ordnance Road has been designated CAOC 8A, Landfill/Surface Disposal Area. In CAOC 8A, Landfill/Surface Disposal Area, the excess cancer risk is  $9.94 \times 10^{-5}$  for the residential exposure scenario, which is at the upper end of the acceptable range of risk ( $10^{-6}$  to  $10^{-4}$ ) defined by the U.S. EPA. PCBs contribute approximately 74 percent of the overall cancer risk. Aroclor-1254 was detected at three surface sampling locations at soil concentrations of 4.045, 0.99, and 0.32 mg/kg. For a commercial/industrial exposure scenario, the excess cancer risk is  $3.02 \times 10^{-5}$ . Based on the fact that the landfill interior has not been fully characterized and therefore the human health risks associated with exposure to the landfill interior are not known, U.S. EPA, ADEQ, and the Navy have made a risk management

decision to restrict the use of CAOC 8A to the current use and to prohibit any land use that could potentially disturb the interior of the landfill.

The maximum concentration of lead detected at CAOC 8A (659 mg/kg) is greater than the U.S. EPA Region 9 residential soil screening value of 400 mg/kg. Therefore, lead represents a potential health risk for future residents at the CAOC 8A Landfill/Surface Disposal Area.

#### **CAOC 10: Ordnance Munitions Disposal Area**

The excess cancer risk calculated from the RI data is  $7.62 \times 10^{-5}$  for the residential exposure scenario and is primarily attributable to PAHs. Benzo(a)pyrene is the PAH driver, with an incremental cancer risk of  $5.62 \times 10^{-5}$ . The excess cancer risk for the industrial exposure scenario is  $2.42 \times 10^{-5}$ .

Based on data from the August, 1996 and February, 1997 field investigations and the RBCs derived in the RI, the excess cancer risk from PAHs for the residential exposure scenario was recalculated as  $4.6 \times 10^{-4}$  and for the industrial scenario,  $1.5 \times 10^{-4}$  (U&A, 1997). The recalculated industrial excess lifetime cancer risk is at the upper end of the range of risks that are potentially acceptable for industrial exposure scenarios.

The RI Risk-Based Criteria (RBCs) used to calculate carcinogenic risk were developed in 1993 using U.S. EPA exposure factors. U.S. EPA's dermal exposure factors have since been revised. If the RBCs were calculated with the current (1996) EPA-approved factors, the RBCs for PAHs would be identical to U.S. EPA Preliminary Remediation Goals (PRGs). Using the same data and calculating the risks using PRGs, the industrial and residential excess lifetime cancer risks are  $7.0 \times 10^{-5}$  and  $2.9 \times 10^{-4}$ , respectively. The industrial excess lifetime cancer risk calculated with PRGs is in the middle of the range of risks that are acceptable for industrial exposure scenarios.

#### **Conclusion**

The risk assessment performed for the 18 OU2 CAOCs indicates that constituents detected in the soil do not pose a significant risk to human populations under current use scenarios. However, at CAOCs 1, 8A, and 10 risks for unrestricted land use may be higher than acceptable. In addition, asbestos was not included in the risk assessment because no risk criteria have been established for asbestos.

ACM was identified at three of the CAOCs. The major risk associated with asbestos is the potential for inhalation of airborne asbestos fibers. Asbestos exposure can cause a number of disabling and fatal diseases. The risk of developing asbestos-related disease is related to the intensity, duration, and nature of the exposure. Large doses of asbestos fibers are clearly linked to a higher incidence of disease. The amount of ACM in the CAOCs at MCAS Yuma is relatively low, and exposure would only occur in the open air. Therefore, the potential for humans to inhale significant amounts of airborne asbestos fibers from the ACM in soils is extremely low; air monitoring conducted during the RI did not detect any asbestos fibers. Risks to ecological receptors from ACM in the environment have not been documented. Although current risks from ACM are low, weathering of ACM in the soils could degrade the ACM and release fibers into the environment. These fibers could become airborne. For this reason, a risk management decision has been made to take remedial action.

Hazardous substances from this site present a substantial threat of release, which may pose a significant risk to human health and the environment if not addressed by implementing the response action selected in this ROD (see Section 2.14).

## **2.11 Summary of Ecological Risks**

The objective of the ecological risk assessment was to evaluate the impact to the environment if remedial actions are not taken. A phased approach was used. The first step, Qualitative Assessment, screened areas based on the physical, chemical, and biological attributes and the potential for a complete exposure pathway. CAOCs with no significant exposure pathways were recommended for no further ecological investigation. The second step was to further evaluate CAOCs with significant exposure pathways by comparing concentrations of chemicals of potential ecological concern (COPECs) with ecological soil screening criteria. Soil screening criteria are discussed in Section 4.16 of the RI Report and derived in Appendix Q of the RI report (JEG, 1996). COPEC concentrations exceeding soil screening criteria were identified as posing a potential risk to vertebrate receptors. Conversely, COPECs that did not exceed soil screening criteria were concluded to not pose a risk. If a CAOC contained COPECs exceeding screening criteria, other supporting evidence was used to identify whether a significant impact had occurred or was likely to occur.

With the exception of migratory birds that have been observed in the airspace above MCAS Yuma, no state or federally listed threatened or endangered species are currently known to be present at MCAS Yuma. No critical habitats or habitats of endangered species are affected by COPECs at OU2.

In general, the COPECs identified at the CAOCs are fairly immobile and the majority of detected inorganic risk drivers can be attributed to background. In addition, the majority of the CAOCs either have only a small portion of the CAOC that could provide contact between receptors and potentially contaminated soil, have been significantly altered by vehicular traffic and disposal activities, or have only a limited area of remaining natural habitat. Therefore, the ecological risk assessment performed for the 18 OU2 CAOCs indicated that constituents detected in the soil and surface water do not pose a significant risk to ecological receptors.

## **2.12 Description of Alternatives**

### **2.12.1 Introduction**

Based upon the human health and ecological risk assessments, U.S. EPA, ADEQ, and the Navy agreed that no further action is required at 12 of the 18 CAOCs to protect human health or the environment. However, because of the presence of ACM in three CAOCs, remedial action (cleanup) is required to protect human health, since the ACM could release asbestos fibers into the environment if left to weather under current conditions. In addition, institutional controls are necessary for CAOCs 1, 8A, and 10 to minimize potential health risks that might be associated with land use changes at these CAOCs.

### **2.12.2 CAOCs Requiring Remediation of ACM in Soil**

The OU2 RI identified CAOCs 4, 7, and 9 as containing ACM. These CAOCs were evaluated in the FS for remedial action (U&A, 1996b). Two of the CAOCs have been divided into soil remedial units; a remedial unit is defined as the area or volume of ACM or ACM-contaminated soil to be remediated. The following describes the lateral and vertical extent of ACM in soil requiring remedial action.

#### **CAOC 4-Radar Hill Disposal Area**

CAOC 4 is located south of Radar Hill in the central portion of MCAS Yuma (Figures 1-2 and 2-4). Two areas were confirmed to contain ACM:

- 4A Area north of Building 38 and east of Building 40: Small pieces of asbestos-containing transite, cement pipe, and roofing materials mixed with soil and other construction debris. The ACM was observed scattered over the surface in an area of approximately 56,400 square feet. A field investigation found that the contamination extended to approximately seven feet in depth in a limited area of approximately 12,550 square feet near the central portion of the unit (approximately 4,000 cubic yards after excavation).
- 4B Area west of Radar Hill: One debris pile containing approximately three cubic yards of ACM fiberboard is located in this area.

#### **CAOC 7--Fire School Area and Debris Piles South of the Combat Aircraft Loading Apron (CALA)**

CAOC 7 contains two remedial units designated CAOC 7A (Fire School Area) (Figure 2-5) and CAOC 7B (Debris Piles South of CALA) (Figure 2-6).

- 7A Fire School Area: Small broken pieces of asbestos-containing transite siding and transite pipe were observed at the surface south and east of the active fire-training pit. The area contaminated with ACM is approximately 179,000 square feet. Over most of the unit, the ACM occurs only as surface scatter. In a limited area near the active burn pit, the ACM contamination reaches a maximum of one foot deep (up to 1,200 cubic yards after excavation).
- 7B Debris Piles South of CALA: The area immediately south of CALA has been used for dumping construction debris. Seven sites within this area were confirmed to contain ACM debris. These sites consist of isolated, coherent piles (in one case, a single piece) containing one or more of the following types of ACM: floor tile with asbestos-containing mastic, transite, and/or ACM pipe. The total volume of ACM debris is approximately 10 cubic yards.

#### **CAOC 9--Horse Stable Area**

A small pile of construction debris, north of the horse stable, was confirmed to contain asbestos-containing mastic (cement) adhered to non-ACM tiles (Figure 2-8). The maximum volume of ACM at this CAOC is estimated to be less than one cubic yard.

### **2.12.3 Alternatives Considered for Remediating CAOCs 4,7, and 9**

Four alternatives have been developed and evaluated for the remediation of ACM at MCAS Yuma. The alternatives are listed and described below.

#### **Alternative 1--No Action**

The No-Action alternative was used as a baseline alternative against which other alternatives were judged. With this alternative, there would be no action to treat, contain, or remove any of the surface ACM or ACM-contaminated soil. In the long term, ACM fragments may degrade and release asbestos fibers into the environment. Short-term conditions would remain unchanged. There are no costs associated with this alternative.

#### **Alternative 2--Cleanup of Surface ACM Debris**

Under this alternative, ACM fragments visible on soil surfaces would be collected manually. Collection would include removing approximately the upper inch of soil beneath the ACM to reduce

the potential for asbestos fibers remaining behind in the soil. The ACM and soils would be stockpiled, manifested, loaded, transported, and disposed of at a permitted facility.

The ACM mixed with soils beneath the surface in CAOCs 4A and 7A would remain in place. Because ACM would remain in place in the eastern portion of CAOC 4A, this area would require long-term maintenance to prevent buried ACM from becoming exposed and dispersed in the environment, and a Base Master Plan restriction indicating that ACM is present. The total estimated cost for implementing this alternative is approximately \$90,000.

#### **Alternative 3--Cleanup of ACM on Soil Surface and Excavation of Soils Mixed with ACM**

Under this alternative, ACM fragments visible on soil surfaces would be collected manually, as described under Alternative 2. In areas in which ACM is mixed with soil beneath the surface (CAOC 4A, north of Building 38; and CAOC 7A, limited area near the active burn pit), the contaminated soils would be excavated with conventional construction equipment. The ACM and soils would be stockpiled, manifested, loaded, transported, and disposed of at a permitted facility. The total estimated cost for implementing this alternative is approximately \$710,000.

#### **Alternative 4--Cleanup of ACM on Soil Surface, Partial Excavation, and Partial Capping.**

Under this alternative, ACM fragments visible on soil surfaces would be collected manually, as described under Alternative 2. In the limited area near the active burn pit (CAOC 7A), where ACM is mixed with surface soils to a maximum depth of one foot, the contaminated soils would be excavated with conventional construction equipment, as in Alternative 3. This alternative differs from Alternative 3 in that only the central portion of the remedial unit north of Building 38 (CAOC 4A) would be excavated, since the Station has plans to develop this area. The eastern portion of CAOC 4A would be capped with asphalt. Because ACM would remain in place in the eastern portion of CAOC 4A, this area would require long-term maintenance of the cover and a Base Master Plan restriction indicating that ACM is present. The total estimated cost for implementing this alternative is approximately \$880,000.

#### **2.12.4 CAOCs with Potential Health Risks**

The human health risk assessment associated with the OU2 RI indicated that residential use of CAOCs 1 and 10 had a potential to present an unacceptable level of carcinogenic risk. In addition, unrestricted use of CAOC 8A has the potential to pose an unacceptable health risk because the landfill interior has not been fully characterized. The use of institutional controls for these CAOCs was evaluated in the FS (U&A, 1996b).

#### **2.12.5 Alternatives Considered for Responding to Potential Health Risks at CAOCs 1, 8A, and 10**

In accordance with the U.S. EPA Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (U.S. EPA, 1988), general response actions (GRAs) are identified as those general classes of actions that can be taken to manage or control a particular problem at a site. Based on discussions between U.S. EPA, ADEQ, MCAS Yuma, and the Navy <sup>1</sup>, 2 GRAs were selected for consideration as potentially applicable at CAOCs 1, 8A, and 10.

- No Action (included in accordance with CERCLA guidance)
- Institutional controls

<sup>1</sup> Meeting between representatives of U.S. EPA, ADEQ, MCAS Yuma, the Navy, and U&A held on June 20, 1996 in San Francisco, California.

Alternative 1, No Action: The no action alternative does not present an unacceptable risk to human health under current use scenarios. However, unrestricted future uses of the three CAOCs could lead to unacceptable risk levels.

Alternative 2, Institutional Controls: The institutional controls would restrict the land use of CAOC 1 and CAOC 10 to industrial/commercial use and CAOC 8A to the current use (inactive landfill/surface disposal area). The institutional controls would be implemented through the Base Master Plan, which would reference the OU2 ROD. Additions to the Base Master Plan would include a map indicating the locations of the former disposal areas in CAOC 8A. This would include execution and recordation of a VEMUR in accordance with and substantially in the form set out at Arizona Revised Statutes, Section 49-152. The VEMUR would contain language clarifying that it was executed and recorded by the federal government, or the appropriate entity of the federal government, "for itself only, and not as a covenant running with the land". In addition, it would clarify that:

- a. The parties agree that no interest in real property on behalf of the State of Arizona is created either by this VEMUR or by any notice of cancellation of this VEMUR pursuant to A.R.S. 49-152.
- b. The signature of an authorized representative of the Arizona Department of Environmental Quality (ADEQ) which appears herein acknowledges that the remediation of the property was conducted in accordance with the provisions of A.R.S 49-152.

The Base Master Plan would require that any changes in activities in these CAOCs or land use changes be coordinated through and reviewed by the MCAS Yuma Environmental Department. Before the land use restrictions are incorporated in the BMP, the Navy will obtain the approval of the U.S. EPA for the language of the restrictions and the location in the BMP at which the approved language will be incorporated. In the event that the Navy plans any future changes in land use at CAOCs 1, 8A, or 10, the Navy in consultation with U.S. EPA and ADEQ would re-evaluate the remedy in light of the intended land use. If the change in land use is not compatible with the remedy, the remedy may be changed pursuant to CERCLA Sections 120 and 121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) Section 300.430(f)(4)(iii) and the ROD may be amended. If the Navy plans to excess the property to a non-federal entity, it will notify ADEQ and EPA in advance of the execution of any such transfer. The Navy will consult with ADEQ and EPA in revisiting existing land use classifications/restrictions for the CAOC (or, in the alternative, the remedial action selection) to determine if the foreseeable future land use differs from the assumptions made at the time the original remedial action decision was made. At that time, a re-evaluation of the appropriate institutional controls will be undertaken by the Navy, in consultation with ADEQ and EPA. For CAOC 1 or CAOC 10, a change in land use from industrial to residential use would require re-evaluation of the remedy. For CAOC 8A, a change in land use involving any activities that may require disruption and exposure of the landfill interior would require re-evaluation of the remedy. At the time of these future activities, further investigation may be undertaken in order to determine if remediation is required and if the ROD must be amended.

## **2.13 Summary of the Comparative Analysis of Alternatives**

### **2.13.1 Introduction**

The remedial alternatives developed in the FS were analyzed in detail using the nine evaluation criteria required by the NCP (Section 300.430(e)(7)). These criteria are classified as threshold criteria, primary balancing criteria, and modifying criteria. Threshold criteria are listed below:

- Overall protection of human health and the environment
- Compliance with ARARs

Primary balancing criteria are as follows:

- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume through treatment
- Short-term effectiveness
- Implementability
- Cost

Modifying criteria:

- State/support agency acceptance
- Community acceptance

The proposed alternatives were evaluated to identify the alternative providing the best balance among the nine criteria for each CAOC at which remedial actions are required. Evaluation of the four alternatives for ACM with respect to the nine criteria are summarized in Section 2.13.3, and the two alternatives for CAOCs that may present a health risk are similarly evaluated in Section 2.13.4. Note that for the 12 CAOCs that require no further action, ARARs are not triggered because remedial action is not required at these CAOCs.

### **2.13.2 Applicable or Relevant and Appropriate Requirements**

Pursuant to Section 121(d)(1) of CERCLA [42 USC Section 9621(d)], remedial actions must attain a degree of cleanup that assures protection of human health and the environment. In addition, remedial actions that leave hazardous substances, pollutants, or contaminants on site must meet standards, requirements, limitations, or criteria that are ARARs. Federal ARARs may include requirements under any federal environmental laws or state requirements adopted pursuant to a federally authorized program. State ARARs include promulgated requirements under state environmental or facility-siting laws that are more stringent than federal ARARs and that have been identified to the lead federal agency by the State in a timely manner.

Applicable requirements are those cleanup standards, control standards, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances at a CERCLA site.

Relevant and appropriate requirements include those that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances at a CERCLA site, nevertheless address problems or situations sufficiently similar to those encountered at the CERCLA site to indicate that their use is well suited to the particular site. A requirement must be both relevant and appropriate to be designated an ARAR. If no ARAR addresses a particular situation, or if an ARAR is insufficient to protect human health or the environment, then nonpromulgated standards, criteria, guidance, and to-be-considered (TBC) advisories may be used to provide a protective remedy.

On-site response actions may proceed without obtaining permits pursuant to CERCLA Section 121(e). This permit exemption allows the response action to proceed in an expeditious manner, free from potential lengthy delays of approval by administrative bodies. This permit exemption applies to all administrative requirements, whether or not they are actually styled as "permits." Thus, administrative requirements cannot be ARARs.



Off-site remedies must comply with all applicable laws and must obtain all necessary permits and fulfill all administrative procedures.

ARARs are identified on a site-specific basis from information about specific chemicals at the site, specific actions that are being considered as remedies, and specific features of the site location. There are three categories of ARARs.

Chemical-specific ARARs are numerical values or methodologies that, when applied to site-specific conditions, result in the establishment of numerical values. They are used to determine acceptable concentrations of specific hazardous substances, pollutants, and contaminants in the environment.

Location-specific ARARs are restrictions placed on the concentrations of hazardous substances or the conduct of activities solely because the site occurs in a special location, such as a wetland or floodplain.

Action-specific ARARs are technology or activity-based requirements or limitations on actions taken with respect to hazardous waste. In some cases, ARARs that may be associated with a particular remedial action (such as closure, discharge, or land placement) can be characterized as both action-specific ARARs and chemical-specific ARARs, because they include numerical values for chemical concentrations.

### **2.13.3 Preferred Alternative for ACM in Soil**

The preferred alternative for addressing asbestos at MCAS Yuma is Alternative 3, cleanup of ACM on soil surface and excavation of soils mixed with ACM. This alternative meets the nine ranking criteria that the U.S. EPA uses to evaluate alternatives. The remainder of this section summarizes the performance of the preferred alternative against the nine evaluation criteria and notes how it compares to the other alternatives considered. Because the No Action alternative is not protective of human health and the environment, it is not considered in the evaluation.

### **Overall Protection of Human Health and the Environment**

Alternatives 2, 3, and 4 are considered protective of human health and the environment. The preferred alternative (Alternative 3) provides the best protection of human health and the environment, since all ACM is removed from the site.

### **Compliance with ARARs**

The federal ARARs are summarized below:

Federal Chemical-Specific ARARs for ACM at MCAS Yuma: No federal chemical-specific ARARs have been identified for ACM at MCAS Yuma OU2.

Federal Location-Specific ARARs for ACM at MCAS Yuma: Federal laws that were identified by the Navy as potential location-specific ARARs (JEG, 1995d) include the following:

- National Historic Preservation Act, 16 USC Section 470-470w-6 [36 CFR Part 800] and the Archeological Resource Protection Act, 16 USC Section 470ii [36 CFR Part 299]: Scientific, prehistoric, or archaeological artifacts may be present at MCAS Yuma.
- Endangered Species Act, 16 USC 1531 et seq.; and Fish and Wildlife Coordination Act, 16 USC 661 et seq. [50 CFR Parts 200 and 402, and 33 CFR Parts 320-330]: With the exception of migratory birds that have been observed in the airspace above MCAS Yuma,

no state or federally listed threatened or endangered species are currently known to be present at MCAS Yuma.

- Migratory Bird Treaty Act of 1972, 16 USC 703: Migratory birds have been observed in the airspace above MCAS Yuma.

ACM waste at MCAS Yuma was disposed of at the land surface. The federal laws given above do not appear to apply to the remedial action alternatives because the alternatives are not anticipated to disturb habitats or excavate native soils. In addition, the Station is not expected to be included in or eligible for the National Register of Historic Places. A 1997 archeological survey of MCAS Yuma identified a circa 1940s historic trash site and three isolated occurrences of Native American Pottery; none of these sites are impacted by remedial activities for OU2. Thus, no federal location-specific asbestos ARARs pertaining specifically to asbestos or to the selection of remedial action alternatives have been identified.

Federal Action-Specific ARARs: Federal action-specific ARARs include the following:

- Clean Air Act, National Emission Standard for Hazardous Air Pollutants (NESHAP) USC 7401 to 7671(q): Asbestos was first designated as a hazardous air pollutant under the Clean Air Act in 1971. The National Emission Standard for Hazardous Air Pollutants (NESHAP) for asbestos found at 40 CFR Section 61, Subpart M is considered an action-specific ARAR for the site. ADEQ is the lead agency for asbestos NESHAP compliance. The requirements listed below are not applicable, because they address asbestos from operations (i.e., demolition, renovation, fabricating, and spraying) that are not related to the proposed remedial action. The substantive requirements are considered relevant and appropriate, however, because they address problems similar to those encountered at CERCLA sites.
- Section 61.145: Applicability, Notification Requirements, and Asbestos Emission Control: NESHAP applies to demolition or renovation of facilities with ACM. Remediation of ACM at MCAS Yuma is neither a renovation nor demolition operation. Notification (Section 61.145(b)) is an administrative requirement that is not applicable to CERCLA actions. However, procedures for asbestos emission control (Section 61.145(c)) are substantive requirements that are considered relevant and appropriate.
- Section 61.150: Standards for Waste Disposal for Manufacturing, Fabricating, Demolition, Renovation and Spraying Operations: Procedures for ACM waste handling, transportation, and disposal are considered relevant and appropriate. Both the administrative and substantive requirements of this section are considered ARARs because transportation and disposal will occur off site.

The state ARARs are summarized below:

State Chemical-Specific ARARs for ACM at MCAS Yuma: No state chemical-specific ARARs have been identified for ACM at MCAS Yuma OU2.

State Location-Specific ARARs for ACM at MCAS Yuma: The following state law was identified by the Navy as a potential location-specific ARAR (JEG, 1995d):

- Arizona Revised Statutes, Title 41: State Government; Chapter 4.1, History, Archaeology and State Emblems; Article 4: Archaeological Discoveries [ARS 41-844A]: Archaeological, palaeontological, or historical features may be discovered at MCAS Yuma during the course of surveys, excavations, or construction that occur during a

remedial action.

ACM waste at MCAS Yuma was disposed of at the land surface. The state law identified in this section does not appear to apply to the remedial action alternatives. MCAS Yuma is currently consulting with the Arizona historic preservation office. Although a final determination has not yet been made, the Station is not expected to be included in or eligible for the National Register of Historic Places. A 1997 archeological survey of MCAS Yuma identified a circa 1940s historic trash site and three isolated occurrences of Native American Pottery; none of these sites are impacted by remedial activities for OU2. Thus, no state location-specific asbestos ARARs pertaining specifically to asbestos or to the selection of remedial action alternatives have been identified.

State Action-Specific ARARs: ADEQ is the lead agency for implementing NESHAP, which was identified as an ARAR under the discussions of federal ARARs.

Other Criteria: As discussed above, if no ARAR addresses a particular situation, or if an ARAR is insufficient to protect human health or the environment, then nonpromulgated standards, criteria, guidance, and to-be-considered (TBC) advisories may be used to provide a protective remedy. Other criteria that were evaluated as potential TBC include the following:

Chief of Naval Operations Instruction (OPNAVINST) 5100.23D, Chapter 17: The Navy manual provides guidance for controlling or eliminating the exposure of Navy personnel to asbestos during the use, removal, and disposal of ACM.

These provisions apply primarily to building structures and facilities and are guidance only. Since compliance with the NESHAP requirements discussed above under federal action-specific ARARs and with federal OSHA are considered sufficient to provide a remedy that is protective of human health and the environment, the Navy manual is not considered TBC.

Summary of Compliance of with ARARs: Alternatives 2, 3, and 4 are in compliance with ARARs. A brief summary of the ARARs applicable to the remediation of ACM contamination at OU2 is given in Table 2-6.

#### **Long-Term Effectiveness and Permanence**

Alternatives 3 and 4 provide adequate long-term effectiveness and permanence. For Alternative 2, in areas where ACM is mixed with subsurface soil, this alternative is not effective for several reasons:

- Wind and water erosion may remove surface soils, exposing the ACM fragments mixed with subsurface soils. If ACM become uncovered, additional cleanup would be required.
- The Station would have to place a Base Master Plan restriction indicating that ACM is present in these areas. Future development may be limited.

#### **Reduction of Toxicity, Mobility, or Volume by Treatment**

This criterion is not applicable because none of the alternatives reduce toxicity, mobility, or volume through treatment.

#### **Short-Term Effectiveness**

There may be minimal short-term health and safety risks to nearby workers from dust emissions during remedial actions. Overall, Alternatives 2, 3, and 4 are considered effective in the

short term for the following reasons:

- Controls, such as dust control and air monitoring, would be implemented to minimize environmental impacts.
- Workers would be adequately protected during the remedial action by compliance with Occupational Safety and Health Administration (OSHA) requirements.
- Can be implemented within a few weeks.

#### **Implementability**

There are no technical, administrative, or availability of services and materials concerns regarding the implementability of the remedial alternatives. Loading and transportation of soil and ACM debris are widely used and can be accomplished using well established, conventional construction techniques and equipment.

#### **Cost**

Alternatives 3 and 4 are considered the most protective of human health and the environment and have the highest long-term effectiveness. The preferred alternative, Alternative 3, is more cost effective (\$710,000) than Alternative 4 (\$880,000).

#### **State Acceptance**

ADEQ agrees with the preferred alternative (Alternative 3).

#### **Community Acceptance**

Based on public input on the Proposed Plan (see Section 3.3) the preferred alternative is acceptable to the community (Alternative 3).

Based on U.S. EPA evaluation criteria, the rationale for selecting Alternative 3 as the preferred alternative is as follows:

- It provides long-term protection of human health and the environment.
- It does not require long-term operation and maintenance.
- It allows unrestricted future Station use.
- It is acceptable to the Navy, regulatory agencies, and the community.

#### **2.13.4 Preferred Alternative for Responding to Potential Health Risks at CAOCs 1, 8A and 10**

The preferred alternative for addressing potential health risks at CAOCs 1, 8A, and 10 at MCAS Yuma is Alternative 2, institutional controls. This alternative meets the nine ranking criteria that the U.S. EPA uses to evaluate alternatives. The remainder of this section summarizes the performance of the preferred alternative against the nine evaluation criteria and notes how it compares to the No Action alternative.

#### **Overall Protection of Human Health and the Environment**

Alternatives 1 and 2 are considered protective of human health and the environment under current use scenarios for CAOCs 1, 8A, and 10. The preferred alternative (Alternative 2) provides the best protection of human health and the environment, since risk would be managed for any future changes in land use scenarios at these CAOCs.

#### **Compliance with ARARs**

Compliance with Federal ARARs: Federal ARARs have not been identified for PAHs in soils at CAOC 1 and CAOC 10 or PCBs in soils at CAOC 8A.

Compliance with State Location- and Action-Specific ARARs: State location- and action-specific ARARs have not been identified for PAHs in soils at CAOC 1 and CAOC 10 or PCBs in soils at CAOC 8A.

Compliance with State Chemical-Specific ARARs:

Under the authority of Arizona Revised Statutes Section 49-151 and Section 49-152, ADEQ has established Department-wide standards applicable to soil remediation activities. The Amended Soil Remediation Rules were adopted in Arizona Administrative Code (AAC) Title 18, Chapter 7, Article 2, Interim Soil Remediation Standards (Sections R18-7-201 through R18-7-209) in 1996. These regulations are not considered "applicable", since remedial actions are being conducted pursuant to federal law (i.e., CERCLA), rather than under one of the State regulatory programs listed in AAC, Title 18, Section R18-7-202.A. Nor is the Marine Corps requesting a "close-out document", as described in R18-7-202.B, for a cleanup under State law. State concurrence is being sought in the remedy selected under federal law. However, the Marine Corps has determined certain substantive requirements of AAC, Title 18, Chapter 7, Article 2 to be relevant and appropriate to the soil remediation activities described in this ROD.

The regulations allow soil remediation activities that attain one of three standards (Section R18-7-203): 1) remediation to background levels; 2) remediation to the Health Based Guidance Levels (HBGLs) presented in Appendix A of Title 18, Chapter 7, Article 2; or 3) remediation to levels derived from a site-specific risk assessment. HBGL values for the PAHs and PCBs detected at CAOCs 1, 8A, and 10 are presented in Table 2-8.

Other Criteria: As discussed above, if no ARAR addresses a particular situation, or if an ARAR is insufficient to protect human health or the environment, then nonpromulgated standards, criteria, guidance, and to-be-considered (TBC) advisories may be used to provide a protective remedy. Other criteria that were evaluated as potential TBC include the following:

- U.S. EPA Guidance USEPA/540/G-90/007: This guidance describes the recommended approach for evaluating and remediating sites with PCB contamination.

CAOC 8A was the only CAOC at which PCB concentrations were higher than are acceptable for unrestricted, residential land use. Since a human health risk assessment has been performed for current land use at CAOC 8A, Alternative 2 is considered to provide a remedy at CAOC 8A that is protective of human health and the environment. Therefore, the EPA guidance is not considered TBC.

Summary of Compliance with ARARs: Alternative 2 is in compliance with ARARs. A brief summary of the ARARs applicable to CAOCs 1, 8A, and 10 is given in Table 2-7.

#### **Long-Term Effectiveness and Permanence**

Alternative 2 provides adequate long-term effectiveness and permanence. Alternative 1 is not as effective because changes in land use could result in potentially unacceptable risks to human health.

#### **Reduction of Toxicity, Mobility, or Volume by Treatment**

This criterion is not applicable because none of the alternatives reduce toxicity, mobility, or volume through treatment.

## **Short-Term Effectiveness**

Since the human health risk is acceptable for current land uses at CAOCs 1, 8A, and 10, both alternatives are considered effective in the short term.

## **Implementability**

There are no technical or availability of services and materials concerns regarding the implementability of a No-Action alternative. However, the administrative implementability may be an obstacle. It is unlikely that ADEQ and U.S. EPA would accept Alternative 1, because it does not reduce the potential risk to human health in the event of land use changes. There are no barriers to implementing Alternative 2, Institutional Controls.

## **Cost**

There are no costs associated with Alternative 1. For Alternative 2, there would be a small cost associated with the proposed addition to the Base Master Plan. In the future, the language added to the Base Master Plan could incur costs related to future soil investigation, revised risk assessments, and possible remedial activities. These potential future costs cannot be estimated at the present time. However, the activities associated with these costs would likely result only after the ROD has been amended; thus, the cost estimates would be part of the amended ROD and not necessarily part of the present ROD.

## **State Acceptance**

ADEQ agrees with the preferred alternative (Alternative 2).

## **Community Acceptance**

Based on public input on the Proposed Plan (see Section 3.3) the preferred alternative is acceptable to the community (Alternative 2).

Based on U.S. EPA evaluation criteria; the rationale for selecting Alternative 2 as the preferred alternative is as follows:

- It provides long-term monitoring of land uses to ensure that any future changes in land use would not result in unacceptable risks to human health.
- It is acceptable to the Navy, regulatory agencies, and the community.

## **2.14 The Selected Remedies**

### **2.14.1 Selected Remedy for ACM in Soils**

Under the selected alternative, Alternative 3 (Cleanup of ACM on Soil Surface and Excavation of Soils Mixed with ACM), ACM fragments visible on soil surfaces will be collected at the Radar Hill area of CAOC 4B; the burn pit area in CAOC 7A; the ACM piles in the area "south of CALA" (CAOC 7B); and the floor tiles in CAOC 9. In areas in which ACM is mixed with soil beneath the surface (CAOC 4A, north of Building 38; and CAOC 7A, limited area near the active burn pit), the contaminated soils will be excavated with conventional construction equipment. Table 2-9 summarizes the parameters used in the soil volume estimates for the two areas in which ACM is mixed with subsurface soil.

During excavation, air monitoring stations will be established up and downwind of the site to evaluate potential health risks resulting from dust and asbestos exposure during excavation.

Air samples will be collected and analyzed off site for total particulate and asbestos when on site wind velocities exceed a threshold level that could potentially transport dust off site. During excavation, the soil will be watered to minimize dust generation. The bottom and sidewalls of the excavation area will be inspected for the presence of ACM fragments. Remaining soils will be compacted and graded to drain. The ACM and soils will be stockpiled, manifested, loaded, transported, and disposed of at a state and federally permitted facility, Copper Mountain Landfill Facility, in Wellton, Arizona.

The total estimated cost developed for this alternative is approximately \$710,000. Capital costs include excavation, transportation and disposal, and site restorations costs. There is no cost for O&M for this alternative because groundwater monitoring is not required and there are no remedial systems to operate. Tables 2-10 and 2-11 provide a detailed cost estimate.

#### **2.14.2 Selected Remedy for Potential Health Risks at CAOCs 1, 8A, and 10**

Under the selected alternative, Alternative 2, the following institutional controls will be implemented through additions to the Base Master Plan:

- CAOC 1 and 10: In order to control the potential risk from exposure to PAHs in soils, the institutional controls will restrict the land use of CAOC 1 and CAOC 10 to industrial/commercial use. A change in land use from industrial to residential use will require re-evaluation of the remedy. The institutional controls will be implemented through the Base Master Plan, which will reference the OU2 ROD. The Base Master Plan will require that any changes in land use or activities at CAOC 1 or CAOC 10 be coordinated through and reviewed by the MCAS Yuma Environmental Department. The locations of the PAH detections will also be documented in the Base Master Plan.
- CAOC 8A: In order to control the potential risk from the exposure to the landfill interior, institutional controls will restrict the land use of CAOC 8A to the current use. A change in land use at CAOC 8A involving any activities that may disrupt and expose the landfill interior will require re-evaluation of the remedy. The institutional controls will be implemented through the Base Master Plan, which will reference the OU2 ROD. The Base Master Plan will require that any changes in activities or land use at CAOC 8A be coordinated through and reviewed by the MCAS Yuma Environmental Department. The locations of the former disposal areas and the locations of the PCB detections will also be documented in the Base Master Plan.

Before the land use restrictions are incorporated in the BMP, the Navy will obtain the approval of the U.S. EPA for the language of the restrictions and the location in the BMP at which the approved language will be incorporated.

This would include execution and recordation of a VEMUR in accordance with and substantially in the form set out at Arizona Revised Statutes, Section 49-152. The VEMUR would contain language clarifying that it was executed and recorded by the federal government, or the appropriate entity of the federal government, "for itself only, and not as a covenant running with the land". In addition, it would clarify that:

- a. The parties agree that no interest in real property on behalf of the State of Arizona is created either by this VEMUR or by any notice of cancellation of this VEMUR pursuant to A.R.S. 49-152.
- b. The signature of an authorized representative of the Arizona Department of Environmental Quality (ADEQ) which appears herein acknowledges that the remediation of the property was conducted in accordance with the provisions of A.R.S 49-152.

In the event that the Navy plans any future changes in land use at CAOCs 1, 8A, or 10, the Navy in consultation with U.S. EPA and ADEQ would re-evaluate the remedy in light of the intended use changes. For CAOC 1 or CAOC 10, a change in land use from industrial use to residential use will require re-evaluation of the remedy. For CAOC 8A, a change in land use involving any activities that may disrupt and expose the landfill interior will require re-evaluation of the remedy. At the time of these future activities, further investigation may be undertaken in order to determine if remediation is required and if the ROD must be amended. If the change in land use is not compatible with the remedy, the remedy may be changed pursuant to CERCLA Sections 120 and 121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) Section 300.430(f)(4)(iii) and the ROD may be amended. If the Navy plans to excess the property to a non-federal entity, it will notify ADEQ and EPA in advance of the execution of any such transfer. The Navy will consult with ADEQ and EPA in revisiting existing land use classifications/restrictions for the CAOC (or, in the alternative, the remedial action selection) to determine if the foreseeable future land use differs from the assumptions made at the time the original remedial action decision was made. At that time, a re-evaluation of the appropriate institutional controls will be undertaken by the Navy, in consultation with ADEQ and EPA.

There are no costs associated with Alternative 1. For Alternative 2, there may be a small cost associated with the proposed addition to the Base Master Plan. In the future, the language added to the master plan could incur costs related to future soil investigation, revised risk assessments, and possible remedial activities. These potential future costs cannot be estimated at the present time. However, the activities associated with these costs would likely result only after the ROD has been amended; thus, the cost estimates will be part of the amended ROD and not part of the present ROD.

## **2.15 Statutory Determinations**

### **2.15.1 Introduction**

In accordance with DERP, 10 U.S.C. Sec. 2701, et seq. and Executive Order 12580, the Department of Defense (DoD) has been delegated the Presidential authority to respond under CERCLA to releases of hazardous substances, pollutants, and contaminants whenever a release or threat of release occurs on a DoD installation or the sole source of the release is from that installation.". In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for a site must comply with applicable or relevant and appropriate environmental standards established under federal and state environmental laws unless a statutory waiver is justified. The selected remedy also must be cost effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedies meet these statutory requirements.

### **2.15.2 Statutory Determinations for Selected Remedy for ACM in Soils**

#### **Protection of Human Health and the Environment**

The selected remedy protects human health and the environment by removing friable asbestos from the surface and subsurface of CAOCs with ACM present.

#### **Compliance with Applicable or Relevant and Appropriate Requirements**

The selected remedy of collection of surface ACM, excavation of subsurface ACM, and off-site



disposal of ACM and associated soils will comply with applicable or relevant and appropriate chemical-, action-, and location-specific requirements (ARARs). The ARARs are presented below. The selection process is summarized in Table 2-12.

#### **Chemical-Specific ARARs for Asbestos**

No chemical-specific ARARs were identified for ACM at MCAS Yuma OU2.

#### **Location-Specific ARARs**

Federal and state location-specific ARARs identified by the Navy (JEG, 1995d) include the following:

- National Historic Preservation Act, 16 USC Section 470-470w-6 [36 CFR Part 800] and the Archeological Resource Protection Act, 16 USC Section 470ii [36 CFR Part 299]: Scientific, prehistoric, or archaeological artifacts may be present at MCAS Yuma.
- Endangered Species Act, 16 USC 1531 et seq.; and Fish and Wildlife Coordination Act, 16 USC 661 et seq. [50 CFR Parts 200 and 402, and 33 CFR Parts 320-330]: With the exception of migratory birds that have been observed in the airspace above MCAS Yuma, no state or federally listed threatened or endangered species are currently known to be present at MCAS Yuma.
- Migratory Bird Treaty Act of 1972, 16 USC 703: Migratory birds have been observed in the airspace above MCAS Yuma.
- Arizona Revised Statutes, Title 41: State Government; Chapter 4.1, History, Archaeology and State Emblems; Article 4: Archaeological Discoveries [ARS 41-844A]: Archaeological, palaeontological, or historical features may be discovered at MCAS Yuma during the course of surveys, excavations, or construction that occur during a remedial action.

ACM waste at MCAS Yuma was disposed of at the land surface. The requirements identified in this section do not appear to apply to the remedial action alternatives because these alternatives are not anticipated to disturb habitats or excavate native soils. MCAS Yuma is currently consulting with the Arizona historic preservation office. Although a final determination has not yet been made, the Station is not expected to be included in or eligible for the National Register of Historic Places. A 1997 archeological survey of MCAS Yuma identified a circa 1940s historic trash site and three isolated occurrences of Native American Pottery; none of these sites are impacted by remedial activities for OU2. Thus, no location-specific ARARs pertaining specifically to asbestos or to the selection of remedial action alternatives have been identified.

#### **Action-Specific ARARs**

Action-specific ARARs include the following:

Clean Air Act, National Emission Standard for Hazardous Air Pollutants (NESHAP): The National Emission Standard for Hazardous Air Pollutants (NESHAP) for asbestos found at 40 CFR Section 61, Subpart M is considered an action-specific ARAR for the site. ADEQ is the lead agency for asbestos NESHAP compliance. Although the requirements in 40 CFR sections 61.145, 61.150, and 61.154 are not applicable because they address asbestos from operations (i.e., demolition, renovation, fabricating, and spraying) that are not related to the proposed remedial action. The substantive requirements are considered relevant and appropriate, however, because they

address problems similar to those encountered at CERCLA sites. NESHAP includes the following:

- Section 61.145: Applicability, Notification Requirements, and Asbestos Emission Control: NESHAP applies to demolition or renovation of facilities with ACM. Remediation of ACM at MCAS Yuma is neither a renovation nor demolition operation. Notification (Section 61.145(b)) is an administrative requirement that is not applicable to CERCLA actions. However, procedures for asbestos emission control (Section 61.145(c)) are substantive requirements that are considered relevant and appropriate.
- Section 61.150: Standards for Waste Disposal for Manufacturing, Fabricating, Demolition, Renovation and Spraying Operations: Procedures for ACM waste handling, transportation, and disposal are considered relevant and appropriate. Both the administrative and substantive requirements of this section are considered ARARs because transportation and disposal will occur off-site.

There are no RCRA or state equivalent RCRA requirements that are applicable to the selected remedy.

#### **Other Criteria to Be Considered (TBC)**

In implementing the selected remedy, U.S. EPA and the State have agreed to consider procedures that are not legally binding. This category of to-be-considered (TBC) procedures consists of advisories, criteria, or guidance that were developed by EPA, other federal agencies, or states that may be useful in developing CERCLA remedies. Such criteria are used if no ARAR addresses a particular situation, or if an ARAR is insufficient to protect human health or the environment. One such criterion has been identified as a potential TBC.

- Chief of Naval Operations Instruction (OPNAVINST) 5100.23D, Chapter 17: The Navy manual provides guidance for controlling or eliminating the exposure of Navy personnel to asbestos during the use, removal, and disposal of ACM.

These provisions apply primarily to building structures and facilities and are guidance only. Since compliance with the NESHAP requirements discussed above under federal action-specific ARARs and federal OSHA are considered sufficient to provide a remedy that is protective of human health and the environment, the Navy manual is not considered TBC.

#### **Cost Effectiveness**

The selected remedy is cost effective because it has been identified as providing overall effectiveness proportional to its costs. The estimated cost for removal of surface and subsurface ACM under the selected remedy, Alternative 3, is approximately \$710,000. The estimated cost for Alternative 4, removal of surface ACM and capping of subsurface ACM in place at MCAS Yuma, is approximately \$880,000; because ACM would remain in place in the eastern portion of CAOC 4A, this area would require long-term maintenance of the cover and a Base Master Plan restriction indicating that ACM is present. Therefore, the selected remedy is less costly than Alternative 4 and also does not incur future maintenance costs and land use restrictions. Alternative 2 costs less (\$90,000), but does not provide adequate long-term control of the ACM.

#### **Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable**

The preferred alternative provides a permanent solution because the ACM in OU2 will be removed. Therefore, no long-term monitoring or maintenance will be required. Alternative treatment

technologies or resource recovery technologies are not relevant to the ACM cleanup and disposal.

The preferred alternative is effective in the short term for the following reasons:

- Community impacts: None. The community is not in the immediate vicinity. Dust control measures, such as spraying soil with water, will be implemented to minimize environmental impacts. Air monitoring will be conducted to evaluate potential impacts.
- Protection of workers: Loading contaminated soil into trucks for transportation to a landfill has the potential to have an adverse short-term impact on the health of construction workers because of dust and asbestos fibers potentially generated during excavation and loading. These potential adverse impacts will be minimized through use of dust control measures. Workers will be adequately protected during remedial activities by compliance with Occupational Safety and Health Administration (OSHA) regulations (51 CFR Part 22612 and 29 CFR 1910.120).
- Length of remedial action: This alternative can be implemented in approximately 13 days.

There are no technical, administrative, or availability of services and materials concerns regarding the implementability of this alternative. Soil excavation, loading, and transportation are widely used and can be accomplished using well established, conventional construction techniques and equipment. There are no technical considerations that would prohibit excavating, transporting, and disposing of the soil at a permitted landfill. U.S. EPA and ADEQ have determined that this alternative is administratively acceptable. The services and materials required to implement this alternative are readily available.

In summary, the preferred alternative would minimize the potential risk to human health and the environment from ACM and complies with ARARs. Because the preferred alternative complies with ARARs and no ACM will be left in place, it has been accepted by the state. Based on public comment on the alternative, the preferred alternative is acceptable to the community.

#### **Preference for Treatment as a Principal Element**

This criterion is not applicable because none of the alternatives reduce toxicity, mobility, or volume through treatment.

### **2.15.3 Statutory Determinations for Selected Remedy for Potential Health Risks at CAOCs 1, 8A, and 10**

#### **Protection of Human Health and the Environment**

Potential risks to on-site workers are currently within acceptable ranges. Compliance with the institutional controls will ensure that future development of the CAOCs will not result in unacceptable risks.

The institutional controls will restrict the land use of CAOC 1 and CAOC 10 to industrial/commercial use and CAOC 8A to the current use. The institutional controls will be implemented through the Base Master Plan, which will reference the OU2 ROD. Additions to the Base Master Plan will include a map indicating the locations of the former disposal areas in CAOC 8A. This would include execution and recordation of a VEMUR in accordance with and substantially in the form set out at Arizona Revised Statutes, Section 49-152. The VEMUR would

contain language clarifying that it was executed and recorded by the federal government, or the appropriate entity of the federal government, "for itself only, and not as a covenant running with the land". In addition, it would clarify that:

- a. The parties agree that no interest in real property on behalf of the State of Arizona is created either by this VEMUR or by any notice of cancellation of this VEMUR pursuant to A.R.S. 49-152.
- b. The signature of an authorized representative of the Arizona Department of Environmental Quality (ADEQ) which appears herein acknowledges that the remediation of the property was conducted in accordance with the provisions of A.R.S 49-152.

The Base Master Plan will require that any changes in activities or land use in these CAOCs be coordinated through and reviewed by the MCAS Yuma Environmental Department. Before the land use restrictions are incorporated in the BMP, the Navy will obtain the approval of the U.S. EPA for the language of the restrictions and the location in the BMP at which the approved language will be incorporated. In the event that the Navy plans any future changes in land use at CAOCs 1, 8A, or 10, the Navy in consultation with U.S. EPA and ADEQ would re-evaluate the remedy in light of the intended land use. If the change in land use is not compatible with the remedy, the remedy may be changed pursuant to CERCLA Sections 120 and 121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) Section 300.430(f)(4)(iii) and the ROD may be amended.

For CAOC 1 or CAOC 10, a change in land use from industrial to residential use will require re-evaluation of the remedy. For CAOC 8A, a change in land use involving any activities that may require disruption and exposure of the landfill interior will require re-evaluation of the remedy. At the time of these future activities, further investigation may be undertaken in order to determine if remediation is required and if the ROD, must be amended. If the Navy plans to excess the property to a non-federal entity, it will notify ADEQ and EPA in advance of the execution of any such transfer. The Navy will consult with ADEQ and EPA in revisiting existing land use classifications/restrictions for the CAOC (or, in the alternative, the remedial action selection) to determine if the foreseeable future land use (differs from the assumptions made at the time the original remedial action decision was made. At that time, a re-evaluation of the appropriate institutional controls will be undertaken by the Navy, in consultation with ADEQ and EPA.

#### **Compliance with Applicable or Relevant and Appropriate Requirements**

The ARARs are presented below and the selection process is summarized in Table 2-12.

Compliance with Federal ARARs: Federal ARARs have not been identified for PAHs in soils at CAOC 1 and CAOC 10 and PCBs in soils at CAOC 8A.

Compliance with State Location- and Action-Specific ARARs: State location- and action-specific ARARs have not been identified for PAHs in soils at CAOC 1 and CAOC 10 and PCBs in soils at CAOC 8A.

Compliance with State Chemical-Specific ARARs:

Under the authority of Arizona Revised Statutes Section 49-151 and Section 49-152, ADEQ has established Department-wide standards applicable to soil remediation activities. The Amended Soil Remediation Rules were adopted in Arizona Administrative Code Title 18, Chapter 7, Article 2, Interim Soil Remediation Standards (Sections R18-7-201 through R18-7-209) in 1996. These regulations are not considered "applicable", since remedial

actions are being conducted pursuant to federal law (i.e., CERCLA) rather than under one of the State regulatory programs listed in Arizona Administrative Code (AAC), Title 18, Sec. R18-7-202.A. Nor is the Marine Corps requesting a "close-out document", as described in R18-7-202.B, for a cleanup under State law. State concurrence is being sought in the remedy selected under federal law. However, the Marine Corps has determined certain substantive requirements of AAC, Title 18, Chapter 7, Article 2 to be relevant and appropriate to the soil remediation activities described in this ROD.

The regulations allow soil remediation activities that attain one of three standards (Section R18-7-203): 1) remediation to background levels; 2) remediation to the Health Based Guidance Levels (HBGLs) presented in Appendix A to Title 18, Chapter 7, Article 2; or 3) remediation to levels derived from a site-specific risk assessment. HBGL values for the PAHs and PCBs detected at CAOCs 1 and 10 are presented in Table 2-8.

There are no RCRA or state equivalent RCRA requirements that are applicable to the selected remedy.

Other Criteria: As discussed above, if no ARAR addresses a particular situation, or if an ARAR is insufficient to protect human health or the environment, then nonpromulgated standards, criteria, guidance, and to-be-considered (TBC) advisories may be used to provide a protective remedy. Other criteria that were evaluated as potential TBC include the following:

- U.S. EPA guidance USEPA/540/G-90/007: This guidance describes the recommended approach for evaluating and remediating sites with PCB contamination.

Since a human health risk assessment has been performed for current land use at CAOC 8A, Alternative 2 is considered to provide a remedy at CAOC 8A that is protective of human health and the environment. Therefore, the EPA guidance is not considered TBC.

Summary of Compliance of with ARARs: Alternative 2 is in compliance with ARARs. A brief summary of the ARARs for CAOCs 1, 8A, and 10, is given in Table 2-7.

#### **Cost Effectiveness**

A small cost is associated with the proposed institutional controls. In the future, the language added to the master plan could incur costs related to future soil investigation, revised risk assessments, and possible remedial activities. The selected remedy is cost effective because these future costs will only be incurred if land uses at the three CAOCs actually are changed in the future.

#### **Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable**

The preferred alternative requires long-term control of land uses at the three CAOCs. However, permanent solutions that require no control of land uses would require extensive soil investigations and, potentially, expensive remedial activities. Such expenditures are not required to maintain acceptable risk levels under current use scenarios. Therefore, the selected alternative is more cost effective than a permanent solution.

Alternative treatment technologies or resource recovery technologies are not relevant to the potential health risks at CAOCs 1, 8A, and 10.

#### **Implementability**

There are no technical, administrative, or availability of services and materials concerns regarding the implementability of the selected alternative. U.S. EPA and ADEQ have determined that this alternative is administratively acceptable. The selected alternative is also acceptable to the community.

#### **Preference for Treatment as a Principal Element**

This criterion is not applicable because none of the alternatives reduce toxicity, mobility, or volume through treatment.

#### **2.16 Documentation of Significant Changes**

As described in the Responsiveness Summary (Section 3), the Proposed Plan was released for public comment on March 20, 1997 and a public meeting was held on April 9, 1997. This Proposed Plan identified "no action" as the selected response action for 12 of the 18 CAOCs in OU2 because these sites do not pose a threat to human health or the environment. Because of the presence of ACM in three of the CAOCs in OU2, remedial action is required to protect human health and comply with regulatory requirements. The selected remedial action consists of the collection of ACM on soil surfaces and the excavation of soils mixed with ACM. At two CAOCs, a human health risk assessment indicated that residential land use could potentially present an unacceptable health risk and at one other CAOC any change in land use could potentially present an unacceptable health risk; the selected action for these CAOCs is the inclusion of institutional controls for these CAOCs in the Base Master Plan. Comments collected over the 30-day public review period between March 21, 1997 and April 28, 1997 are addressed in Section 3.3.

Responses to the public comments did not require any changes to this Record of Decision.

### **3 Responsiveness Summary**

#### **3.1 Overview**

This section provides a summary of the public comments and concerns regarding the Proposed Plan at MCAS, Yuma. At this time, the Navy has selected the "no further action" preferred alternative for 12 of the 18 CAOCs in OU2 because these sites do not pose a threat to human health or the environment. The selected remedial action for three CAOCs at which ACM were identified in construction debris consists of the collection of ACM on soil surfaces and the excavation of soils mixed with ACM. At an additional two CAOCs, a human health risk assessment indicated that residential land use could potentially present an unacceptable health risk, and at one other CAOC, any change in land use could potentially present an unacceptable health risk; the selected action for these CAOCs is the inclusion of institutional controls for these CAOCs in the Base Master Plan.

#### **3.2 Background on Community Involvement**

The Navy has implemented a progressive public relations and involvement program for environmental activities at MCAS Yuma. A Restoration Advisory Board (RAB), comprising representatives from the Navy, U.S. EPA, the Arizona Department of Environmental Quality, and members of the general public, has been established and meets periodically to involve the public in decisions regarding investigation results, proposed work, and potential remedial options. The Navy has also presented RI plans and results at public meetings conducted on January 18 and April 11, 1996. Before each of these public meetings, the Navy distributed over 40 copies of a fact sheet to interested parties and to the information repositories (Section 2.7). These fact sheets described the installation restoration program at MCAS Yuma, including a discussion of how the public could access more information and become more involved in the program. A synopsis of community relations activities conducted by the Navy is presented in Appendix B.

The Navy held a public comment period on the OU2 preferred alternative from March 21 through April 28, 1997. Copies of the Proposed Plan were placed in the above discussed repositories (Section 2.7) and were mailed to the public for review and comment. The Proposed Plan also invited readers to a public meeting to discuss the preferred alternative and voice their concerns. The meeting was held on April 9, 1997, from 6:00 to 7:20 p.m., in the Yuma County Main Library at 350 South Third Avenue, Yuma, Arizona. Comments received during the public comment period are addressed below.

#### **3.3 Summary of Comments Received During Public Comment Period and Department of the Navy Responses**

Four verbal comments were received at the Public Hearing on the Proposed Plan. The one written comment on the Proposed Plan is included in Appendix B. This written comment did not require a response.

##### **Public Comment**

Mr. John Colvin asked Amanda Stone of the Arizona Department of Environmental Quality to explain the proposed land use restrictions in greater detail. After Ms. Stone provided further information on the legal issues, Mr. Colvin asked if such a land use restriction would also be applicable to the proposed asbestos removal. Mr. Colvin asked if the use of a land use restriction for asbestos debris sites would save the estimated \$710,000 cost of excavating asbestos, as long as the \$90,000 surface cleanup was performed. Mr. Colvin suggested that if the buried asbestos were left in place, the cost of removal could be borne by any future private developer of the sites, rather than by public money.

## **Response**

Amanda Stone, Remedial Project Manager, Arizona Department of Environmental Quality, answered the question. Ms. Stone explained that a land use restriction at the asbestos sites would be much more restrictive than the land use restrictions that maintain the current uses of CAOCs 1, 8A, and 10. Some of the asbestos sites are currently slated for development by the Navy and any excavation at these sites would require removal of the buried asbestos. In addition, as long as the asbestos remains in the ground, there is a potential for accidental breakdown of the asbestos materials and the resulting release of fibers.

## **Public Comment**

Ms. Marla Lewis commented that removing the asbestos now would probably be cheaper than waiting till some unspecified date in the future.

## **Response**

Ms. Stone observed that the cleanup cost for these sites was not bad compared to many other sites.

## **Public Comment**

Mr. Kevin Shaffer asked why the cleanup was not being paid for by Superfund.

## **Response**

Nadine Spertus, Remedial Project Manager, Southwest Division, Naval Facilities Engineering Command, answered the question. Ms. Spertus explained that the Marine Corps and Navy have a separate fund of money called the Environmental Restoration Navy Account. Superfund was specifically set up for private parties and is intended to be a revolving fund that is repaid by identified responsible parties.

## **Public Comment**

Ms. Dottie Lofstrom asked if monitoring wells had been used to study the landfill (CAOC 8A).

## **Response**

Rachel Simons, Remedial Project Manager, U.S. Environmental Protection Agency, Region IX, answered the question. Ms. Simons explained that, although soil samples were not taken from within the landfill, soil samples were collected from the surface of the landfill, soil vapor samples were collected from within the landfill, and groundwater samples were collected from around the perimeter of the landfill.



#### 4        **References**

- Arizona Department of Environmental Quality (ADEQ), 1992. Human Health-based Guidance Levels for the Ingestion of Contaminants in Drinking Water and Soil.
- Environmental Protection Agency (U.S. EPA), 1989a. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities (Interim Final Guidance).
- U.S. EPA, 1989b. Health Effects Assessment Summary Tables (HEAST), National Library of Medicine.
- U.S. EPA, 1992. Guidance for Data Usability in Risk Assessment (Part A). OSWER 9285.7-09A. Office of Emergency and Remedial Response. USEPA/540/G-90/008 (Interim Final).
- U.S. EPA, 1994a. Integrated Risk Information System (IRIS) Database.
- U.S. EPA, 1994b. Region IX Preliminary Remediation Goals (PRGs) First Half 1994. Stanford J. Smucker, Ph.D., Regional Toxicologist.
- U.S. EPA, 1994c. Memorandum on the Role of the Baseline Risk Assessment in Superfund Remedy Selection Decision. OSWER Directive 9355.0-30.
- Federal Facilities Agreement (FFA), 1991. Federal Facility Agreement Under CERCLA Section 120. Signed by U.S. EPA Region 9, State of Arizona, and the U.S. Department of the Navy.
- Jacobs Engineering Group Inc. (JEG), 1994a. Community Relations Plan (Final).
- JEG, 1994b. Final Residential Surface Soil Investigation Report (Draft).
- JEG, 1994c. Technical Memorandum 3, Human Health Risk-Based Criteria for Decision Making (Final).
- JEG, 1995a. MCAS Yuma, Asbestos Survey Results. Technical Memorandum dated February 14.
- JEG, 1995b. Preliminary Draft Chemical-Specific and Location-Specific Applicable or Relevant and Appropriate Requirements Analysis Report, MCAS, Yuma, Arizona. Revision 1, January 3.
- JEG, 1996. Final Remedial Investigation Report, MCAS YUMA. March 26.
- Malcolm Pirnie, Inc., 1988. Confirmation Study Verification Phase, Naval Facilities Engineering Command, Southwest Environmental Section, San Diego, California.
- Malcolm Pirnie, Inc., 1990. Site Inspection Report (Draft).
- Stearns, Conrad, Schmidt and Landau Associates (Stearns et al.), 1985. Initial Assessment Study of Marine Corps Air Station, Yuma, Arizona. Prepared for the Naval Energy and Environmental Support Activity, NEESA 13-077.
- Uribe & Associates (U&A), 1996a. Assessment of ACM Contamination at CAOCs 4,7, and 9 at Marine Corps Air Station Yuma, Arizona, prepared for Southwest Division Naval Facilities Engineering Command, San Diego, California.
- U&A, 1996b. Feasibility Study for Operable Unit 2, Marine Corps Air Station Yuma, Arizona, prepared for Southwest Division Naval Facilities Engineering Command, San Diego, California.

U&A, 1996c. Proposed Plan for Operable Unit 2, Marine Corps Air Station Yuma, Arizona, prepared for Southwest Division Naval Facilities Engineering Command, San Diego, California.

U&A, 1996d. Report of Soil Sampling Program For Polycyclic Aromatic Hydrocarbons at CAOC 10 Operable, Unit 2, Marine Corps Air Station Yuma, Arizona, prepared for Southwest Division Naval Facilities Engineering Command, San Diego, California.

U&A, 1997. Report of Supplemental Soil Sampling Program For Polycyclic Aromatic Hydrocarbons at CAOC 10 Operable, Unit 2, Marine Corps Air Station Yuma, Arizona, prepared for Southwest Division Naval Facilities Engineering Command, San Diego, California.

## 5 Abbreviations/Acronyms

AAC	Arizona Administrative Code
ACM	Asbestos-Containing Material
ADEQ	Arizona Department of Environmental Quality
ADOSH	Arizona Department of Occupational Safety and Health
ARARs	Applicable or Relevant and Appropriate Requirements
ARS	Arizona Revised Statutes
ASTM	American Society for Testing and Materials
bgs	below ground surface
BTEX	Benzene, Toluene, Ethylbenzene, and Total Xylenes
Bureau	U.S. Bureau of Reclamation
CALA	Combat Aircraft Loading Apron
CAOC	CERCLA Area of Concern
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
COPC	Chemical Of Potential Concern
COPEC	Chemical Of Potential Ecological Concern
CPF	Cancer Potency Factor
cy	cubic yard
DDT	1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane
DoD	Department of Defense
ea	each
U.S. EPA	U.S. Environmental Protection Agency
EM	Electromagnetic (survey)
f/cc	fibers per cubic centimeter
FD	Field Duplicate
FFA	Federal Facilities Agreement
FS	Feasibility Study
FSP	Field Sampling Plan
ft	foot
GPR	Ground Penetrating Radar
HBGL	Health-Based Guidance Level
HEAST	Health Effects Assessment Summary Table
HI	Hazard Index
IAS	Initial Assessment Study
IR	Installation Restoration
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
JEG	Jacobs Engineering Group Inc.
kg	kilogram
LAAMBN	Light Anti-Aircraft Missile Battalion
Mag.	Magnetic (survey)
MCAS	Marine Corps Air Station
mg/kg	milligrams per kilogram
mg/l	milligrams per liter
mph	miles per hour
MWWU	Marine Wing Weapons Unit
NCP	National Oil and Hazardous Substances Contingency Plan
NAVFACENGCOM	Naval Facilities Engineering Command
Navy	Department of the Navy
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFESC	Naval Facilities Engineering Services Center (Formerly NEESA)

NPL	National Priorities List
O&M	Operations and Maintenance
OSHA	Occupational Health and Safety Administration or Act (1970)
OPNAVINST	Chief of Naval Operations Instructions
OU	Operable Unit
PAHs	Polynuclear/Polycyclic Aromatic Hydrocarbons
PA/SI	Preliminary Assessment/Site Inspection
PCBs	Polychlorinated Biphenyls
PCE	Perchloroethene (tetrachloroethene)
PEL	Permissible Exposure Limit
ppb	parts per billion
PR	Preliminary Review
PRG	Preliminary Remediation Goals
PR/VSI	Preliminary Review/Visual Site Inspection
PVC	Polyvinyl Chloride
RAB	Restoration Advisory Board
RBC	Risk-Based Criteria
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RME	Reasonable Maximum Exposure
ROD	Record of Decision
SARA	Superfund Amendment and Reauthorization Act
sf	square foot
SI	Site Inspection
Station	Marine Corps Air Station, Yuma
SVOC	Semivolatile Organic Compound
Southwest Division	Southwest Division, Naval Facilities Engineering Command
TBC	To Be Considered
TCA	1,1,1-Trichloroethane
TCE	Trichloroethene (preferred over trichloroethylene)
TLV	Threshold Limit Value
TPH	Total Petroleum Hydrocarbons
TRPH	Total Recoverable Petroleum Hydrocarbons
U&A	Uribe & Associates
USC	United States Code
USCA	United States Code Annotated
USDA	United States Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
UST	Underground Storage Tank
VEMUR	Voluntary Environmental Mitigation Use Restriction
VOC	Volatile Organic Compound
VSI	Visual Site Inspection
Ig/l	micrograms per liter

## **A: Response to Comments**

### **Appendix A**

Response to U.S. Environmental Protection Agency and Arizona  
Department of Environmental Quality Comments on the  
Draft OU2 Record of Decision  
and the  
Draft Final OU2 Record of Decision

U.S. EPA Review Comments on the  
Draft Record of Decision (ROD) for Operable Unit 2  
Marine Corps Air Station, Yuma, Arizona  
Report Dated July 31, 1996  
Comments Dated October 1, 1996

#### **General Comments:**

##### **EPA Comment**

###### **1. CAOC 8A - Southeast Station Landfill**

The conclusion that institutional controls are being implemented at CAOC 8A based on the detection of PAHs and PCBs in the soils is incorrect. Institutional controls are being implemented at CAOC 8A because the interior of the landfill was not investigated during the OU2 Remedial Investigation (RI).

The RI was directed at evaluating the exposure for current land use and future capped conditions. No intrusive sampling was done. Based on the human health risk assessment, it was concluded that a landfill cap was not required under the current land use. Since the interior of the landfill was not investigated under the RI, the risk from exposure to the landfill interior is unknown.

In order to control the potential risk from exposure to the landfill interior, institutional controls will be implemented to restrict the land use to the current use. Please revise the report to reflect this comment.

(This is the same comment as General Comment 1 from the Draft Final OU2 Feasibility Study.)

##### **U&A Response**

The following paragraph (or similar language) has been incorporated into Section 1.4 (page 1-3) and Section 2.10.6 (page 2-23) of the Final Record of Decision:

"CAOC 8A: Intrusive sampling was not conducted at the southeast station landfill during the RI. Based on the human health risk assessment, it was concluded that a landfill cap was not required under the current land use. However, since the interior of the landfill was not investigated during the RI, the risk from exposure to the landfill interior is unknown."

##### **EPA Comment**

###### **2. Institutional Controls**

The following language should be included in the ROD for CAOCs 1, 8A and 10:

"The institutional controls will restrict the land use of CAOCs 1 and 10 to industrial/commercial use and CAOC 8A to the current use. The institutional controls will be implemented through the Base Master Plan (BMP) and the BMP will reference the OU2 ROD, the BMP will indicated that any activities in these CAOCs or land use changes must be

coordinated through and reviewed by the MCAS Yuma Environmental Department.

In the event of any future change in land use, the remedy may need to be re-evaluated in light of the land use changes. If the change in land use is not compatible with the remedy, the remedy may be changed pursuant to CERCLA Section 120 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) Section 300.430 (f)(iii) and the ROD may be amended.

For CAOCs 1 and 10, a change in land use from industrial use to residential use would require re-evaluation of the remedy. For CAOC 8A, a change in land use involving any activities which may require disruption and exposure of the landfill interior would require re-evaluation of the remedy. At the time of these future activities, further investigation may be undertaken in order to determine if remediation is required and if the ROD must be amended."

(This is the same comment as General Comment 2 for the Draft Final OU2 Feasibility Study. The language in the first sentence of the second paragraph has been slightly modified.)

#### **U&A Response**

The requested language (or similar language) has been incorporated into Section 1.5 (page 1-6), Section 1.6, Section 2.12.5, Section 2.14.2, and Section 2.15.3. In addition, the following sentence has been included in the text: "If the land is transferred to a non-federal agency, the Department of the Navy will file a Voluntary Environmental Mitigation Use Restriction (VEMUR), indicating that the property has been remediated to less than residential levels and that the property shall not be used for residential purposes in the future. The VEMUR will be recorded in accordance with Arizona Revised Statutes Section 49-152, as implemented in Arizona Administrative Code Sections R18-7-206 (D)(2)(a) and R18-7-207 (A)."

#### **EPA Comment**

3. Please propose the language that will be added to the BMP restricting the land use of CAOCs 1, 8A and 10 and referencing the MCAS YUMA Environmental Department and the OU2 ROD.

#### **U&A Response**

In a discussion between Southwest Division and U&A, it was agreed that the language to be added to the BMP need not be included in the ROD. <sup>1</sup>

#### **EPA Comment**

4. The rationale used for implementing institutional controls at CAOC 10 should be the same as CAOC 1.

#### **U&A Response**

The Record of Decision has been revised to include the same rationale for the use of institutional controls at CAOC 10 as at CAOC 1.

- <sup>1</sup> Phone conversation on December 3, 1996 between N. Spertus and M. Pound of Southwest Division and S. Knott of U&A.

#### **Specific Comments:**

#### **EPA Comment**

1. Section 1.2, Site Name and Location, page 1-1

The second sentence of this section states, "Yuma Marine Corps Air Station (Station) was declared a permanent Air Force installation in 1954." From this statement, it sounds like the Base is still operated by the Air Force. Please add a subsequent sentence stating when the

Marine Corps took over operation of the Base.

**U&A Response**

The following sentence has been added to Section 1.2

"In January 1959, the Station and its associated range facilities were, transferred to the U.S. Navy."

**EPA Comment**

2. Section 1.4 Assessment of the Site, page 1-3

CAOC 8A should be deleted from the bullet on the top of this page and identified under a separate bullet. The bullet should explain that CAOC 8A requires action because the interior of the landfill has not been fully characterized and therefore, the risk to human health is unknown (see General Comment 1).

**U&A Response**

The requested edits have been made (See response to General Comment 1).

**EPA Comment**

3. Section 1.5 Description of the Selected Remedy, page 1-5

Alternative 2 - Additions to the Base Master Plan

Please state in the first paragraph that the locations of the former disposal areas for CAOC 8A will be documented in the BMP.

This comment also applies to the first sentence of the last paragraph of Section 1.6, Statutory Determination, page 1-6.

**U&A Response**

The requested edits have been made.

**EPA Comment**

4. Section 2.4 Enforcement and Regulatory History, page 2-4

Please rewrite the third sentence of the second paragraph on this page as follows, "One to address potential areas of groundwater contamination and soil contamination deeper than 10 feet below ground surface (OU1)."

**U&A Response**

The requested edit has been made.

**EPA Comment**

5. Section 2.6.8 CAOC 7: Fire School Area, page 2-8

The text reports CAOC 7 to occupy an area of approximately 0.45 acre. The RI report describes that the entire area encompasses approximately 40 acres. Please correct.

**U&A Response**

The requested edit has been made.

**EPA Comment**

6. Section 2.6.9 CAOC 8: Southeast Station Landfill, page 2-9

The text describes the finding of hydrocarbons, PCBs, solvents, pesticides, and metals in the shallow soils at CAOC 8. The detection of polynuclear aromatic hydrocarbons (PAHs) should also be discussed. The term hydrocarbons was earlier defined as fuel-related chemicals (i.e. TRPH).

**U&A Response**

The requested edit has been made.

**EPA Comment**

7. Section 2.6.11 CAOC 10: Ordinance Munitions Disposal Area, page 2-9

The text describes that hydrocarbons and one anomalous elevated lead concentration have been detected in the shallow soils underlying this area. The text should also discuss the finding of PAHs in soil.

**U&A Response**

The requested edit has been made.

**EPA Comment**

8. Section 2.6.14 CAOC 13: Drain Field Area, page 2-10

The text describes that rinse fluids from filling and mixing equipment for chemical weapons at the MWWU were disposed at CAOC 13. It is suggested that the text be expanded to indicate that the chemical weapons were limited to tear gas and napalm.

**U&A Response**

According to the MCAS Yuma Environmental Department, chemical weapons have not actually been used at MCAS Yuma (See MCAS Yuma Environmental Department Comment 12). The text has been revised as follows:

"Liquid rinsates from filling and mixing equipment used for simulated chemical weapons (tear gas and napalm) at the MWWU were disposed of to a drain field south of former Building 1585."

**EPA Comment**

9. Section 2.7 Highlights of Community Participation, page 2-12

Please remove the text from the third sentence of this section beginning with, "For additional information, contact..." through the address for "Rachel Simons". This information is too much detail for the ROD.

**U&A Response**

The text has been removed as requested.

**EPA Comment**

10. Section 2.8 Scope and Role of Operable Unit 2, page 2-15

In preceding sections, the 18 CAOCs are described in great detail identifying what contaminants were found in these areas. However in the last paragraph of this section, 13 CAOCs are dismissed as needing no further action with no explanation other than a reference to the RI. In lieu of the RI reference, please explain briefly why the 13 areas are no longer considered areas of concern and reference the appropriate supporting sections in the ROD.

It is also confusing why the 13 CAOCs which are no longer areas of concern are continually referring to as CAOCs. Please explain that "CAOC" is a term used to identify a potential hazardous waste site, but a CAOC is not necessarily a site that requires remediation.

**U&A Response**

The number of CAOCs that are no longer areas of concern has been reduced to 12 because CAOC 10 has been included in the CAOCs at which institutional controls will be implemented. The following text has been inserted into Section 2.8:

"The RI investigated 18 CAOCs at which surface or near-surface disposal or releases of



wastes may have occurred. The investigation of OU2 was limited to an assessment of the risk/hazard posed by contaminants in the upper 10 feet of soil. No risk to the environment was identified at the 18 CAOCs (See Section 2.11). Based on the human health risk assessments summarized in Section 2.10, 15 of the 18 CAOCs may safely be used for residential land use, while chemicals identified at CAOCs 1, 8A, and 10 present acceptable health risks if their current, non-resident land uses are maintained. Institutional controls will be implemented for CAOCs 1, 8A, and 10 to minimize potential health risks that might be associated with land use changes at these CAOCs.

ACM, which was not included in the risk assessments because acceptable exposure limits have not been established for ACM, was identified in three of the 15 CAOCs that were assessed to be acceptable for residential land use. The ACM at these three CAOCs (4,7, and 9) is the only material within OU2 for which removal actions are recommended.

No remedial action is recommended for the 12 CAOCs that are acceptable for residential land use and have no identified ACM. Although these areas do not present human health risks or ecological risks, they are still be referred to as CAOCs (CERCLA Areas of Concern) in this document because, although the term "CAOC" is used to identify a potentially hazardous site, a CAOC is not necessarily a site that requires remediation."

**EPA Comment**

11. Table 2-2 Analyte Groups and Associated Methods, page 2-17

Please remove this table because it contains too much detail for the ROD.

**U&A Response**

Table 2-2 has been deleted as requested.

**EPA Comment**

12. Section 2.9 Site Characteristics, page 2-18

A detailed description of the RI approach is not required for the ROD. Please remove the text from "Soil Gas Surveys" through the end of page 2-19

**U&A Response**

The text has been removed as requested.

**EPA Comment**

13. Section 2.9.1 CAOC 1: Right Line, page 2-20

Since the OU2 RI/FS is referenced in the ROD, it is not necessary to summarize detailed site information and contaminant concentrations. Section 2.6.2 through 2.6.18 provide sufficient detail for describing the CAOCs. EPA recommends deleting Section 2.9.1 (page 2-20) through Section 2.9.18 (page 2-38).

**U&A Response**

Section 2.9.1 through Section 2.9.18 have been deleted as requested. The final paragraphs of these sections, which briefly summarize the findings of the Field Investigation, have been incorporated into Sections 2.6.1 through 2.6.18.

**EPA Comment**

14. Table 2-5 Maximum concentration of Pesticides and PCBs Detected as COPCs at 0 to 10 Feet, MCAS Yuma, Operable Unit 2, page 2-23a

The Risk-Based Criteria for Pesticides and PCBs, and the results for CAOCs 1 and 2 appear to be omitted from Table 2-5.

**U&A Response**

The first page of Table 2-5 was accidentally not bound with the Draft Record of Decision. This error has been corrected. Note that the tables have been moved to the end of the ROD, behind the Tab labeled "Tables".

#### **EPA Comment**

15. Section 2.10.6 Summary of Risks at Individual CAOCs, page 2-43; and Table 2-7 Summary of Risk Assessment Results, MCAS Yuma, Operable Unit 2, page 2-44

The text and table report the Residential Scenario Hazard Index and Commercial/Industrial Hazard Index as incremental values over that contributed by background metals. This is an inaccurate presentation of non-cancer health risk. For substances which have a threshold of action (non-carcinogens), the background level plus the concentration of the chemical from site activities might produce a combined exposure which exceeds the threshold for toxic effects. Subtracting the background levels before calculating risk could therefore misrepresent the threat to public health associated with the site-related contamination, resulting in the false conclusion that the site-related chemicals do not impose a risk of adverse effects on health. The text and table should summarize the findings of the RI in which the table should summarize the findings of the RI in which the cumulative noncancer hazard index was evaluated, and if necessary, a target organ system analysis was performed.

#### **U&A Response**

Based on a discussion on October 10, 1996 between U&A, Southwest Division, and the U.S. EPA, the contents of Section 2.10.6 have been significantly abridged. The CAOCs for which the RI found that there was no significant health risk are not discussed in detail in the revised text of Section 2.10.6. It was agreed that the ROD would state that the health risks are acceptable for all CAOCs other than 1, 8A, and 10. Only CAOCs 1, 8A, and 10, at which unrestricted land use could lead to unacceptable health risks, are discussed in detail in Section 2.10.6. Therefore, the table and the majority of the text addressed by this comment are not present in the current draft of the Record of Decision.

#### **EPA Comment**

16. Table 2-7 Summary of Risk Assessment Results, page 2-44

Please change the title of the second column for Most Likely Use Scenario to Current Use Scenario.

The second column titled Risk Assessment Scenario is confusing since both the residential and industrial scenarios were calculated in the risk assessment. A clearer title would be Risk Assessment Scenarios within the Acceptable Risk Range (10<sup>-4</sup> to 10<sup>-6</sup>).

#### **U&A Response**

Table 2-7 has been deleted from the Record of Decision (See response to Specific Comment 15).

#### **EPA Comment**

17. Table 2-7 Summary of Risk Assessment Results, MCAS Yuma, Operable Unit 2, page 2-44.

- a) The Residential Scenario Excess Cancer Risk for CAOC 18 should be changed from <3 E-08 to E-08.
- b) The Residential Scenario Hazard Index for CAOC 2 should be changed from zero to 0.08. (Refer to Specific Comment 15).
- c) The Residential Scenario Hazard Index for CAOC 9 should be changed from 0.18 to 0.04 (Refer to Specific Comment 15).

#### **U&A Response**

Table 2-7 has been deleted from the Record of Decision (See response to Specific Comment 15).

#### **EPA Comment**

18. Section 2.10.6.1 CAOC 1: Flight Line, page 2-45

Please rewrite the fourth sentence as follows, "The excess cancer risk for CAOC 1 is  $6.48 \times 10^{-5}$  for the industrial/commercial exposure scenario."

**U&A Response**

This sentence (now the first of the paragraph) has been edited as requested. Note that this text is now in revised Section 2.10.6 and that the current draft of the Record of Decision does not include a Section 2.10.6.1.

**EPA Comment**

19. Section 2.10.6.8 CAOC 8: Southeast Station Landfill, page 2-46

In the second paragraph, please delete the following statement:

"...even though the area is almost entirely enclosed by a chain-link fence, access to vehicles is limited, and the period of time a human receptor is inside the area is relatively short."

The role of the risk assessment is to evaluate the potential future land uses as well as the current land use.

**U&A Response**

The requested edit has been made. Note that this text is now in revised Section 2.10.6 and that the current draft of the Record of Decision does not include a Section 2.10.6.8.

**EPA Comment**

20. Section 2.10.6.8 CAOC 8: Southeast Station Landfill, page 2-47

Please delete the last sentence of the second paragraph of this section. This sentence should be rewritten as follows:

"Based on the fact that the landfill interior has not been fully characterized and therefore the human health risks associated with exposure to the landfill interior are not known, US EPA, ADEQ, and the Navy has made a risk management decision to restrict the land use of CAOC 8A to the current use and to prohibit any land use that could potentially disrupt and expose the interior of the landfill."

**U&A Response**

The requested edit has been made. Note that this text is now in revised Section 2.10.6 and that the current draft of the Record of Decision does not include a Section 2.10.6.8.

**EPA Comment**

21. Section 2.11.6 CAOC 5: Old 2nd LAAMBN Compound, page 2-51

The text states that two metals and two pesticides were found to exceed the soil toxicity criteria. However, the RI concluded that it is unlikely that vertebrate receptors would be significantly impacted. The text should indicate that this conclusion was based on the observations that the COPECs are fairly immobile and do not appear to be related to site releases.

**U&A Response**

Based on a discussion on October 10, 1996 between U&A, Southwest Division, and the U.S. EPA, the contents of Section 2.11 have been significantly abridged. The requested language has been incorporated into a general discussion of the ecological risk at OU2. The discussion of individual CAOCs has been removed.

**EPA Comment**

22. Section 2.12.4 CAOCs with Potential Health Risks, page 2-57

Please explain that CAOC 8A poses an unacceptable risk because that landfill interior has not been fully characterized and not because the residential scenario presents an unacceptable human health risk (see General Comment 1).

**U&A Response**

The text has been amended as requested

**EPA Comment**

23. Section 2.12.5 Alternatives Considered for Responding to Potential Health Risks at CAOC 1 and CAOC 8A, page 2-57

Alternative 2, Additions to the Base Master Plan

Please state in the first paragraph that the locations of the former disposal areas for CAOC 8A will be documented in the BMP.

**U&A Response**

The text has been amended as requested

**EPA Comment**

24. Section 2.13.1 Introduction, page 2-58

It is helpful to add the citation that requires the evaluation of the nine criteria and to mention the criteria classifications. The following is suggested language for the ROD:

"The remedial alternatives developed in the FS were analyzed in detail using the nine evaluation criteria required by the NCP (Section 300.430 (e)(7)). These criteria are classified as threshold criteria, primary balancing criteria, and modifying criteria.

Threshold criteria are:

- Overall protection of human health and the environment; and
- Compliance with ARARs.

Primary balancing criteria are:

- long-term effectiveness and permanence;
- reduction of toxicity, mobility, or volume through treatment;
- short-term effectiveness;
- implementability; and
- cost.

Modifying criteria are:

- state/support agency acceptance; and
- community acceptance."

The resulting strengths and weaknesses of the alternatives were weighted to identify the alternative providing the best balance among the nine criteria for each landfill site. The nine criteria are summarized in the following sections."

**U&A Response**

The suggested text has been incorporated in Section 2.13.1. The final paragraph has been revised to incorporate references to appropriate discussions of the ARARs for sites with ACM and sites with Potential Health Risks, as well as to incorporate language recommended in Specific

Comment 25.

**EPA Comment**

25. Section 2.13.2 Preferred Alternatives for ACM Soil, page 2-59  
Compliance with ARARs

This section should include an explanation of what ARARs are, when they are used, and what the ARAR categories are. In addition for the 13 sites that require no further action, a sentence should be added explaining that ARARs will not be triggered at these sites because they do not require remedial action. Thus, ARARs only apply to those sites where there will be an action.

The following is suggested language for the ROD:

"Pursuant to Section 121 (d)(1) of CERCLA [42 USC Section 9621 (d)], remedial actions must attain a degree of cleanup which assures protection of human health and the environment. Additionally, remedial actions that leave hazardous substances, pollutants, or contaminants on site must meet standards, requirements, limitations, or criteria that are ARARs. Federal ARARs may include requirements under any federal environmental laws. State ARARs include promulgated requirements under State environmental or facility-siting laws that are more stringent than federal ARARs and that have been identified to US EPA by the State in a timely manner.

Applicable requirements are those clean-up standards, control standards, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances at a CERCLA site.

Relevant and appropriate requirements include those that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances at a CERCLA site, nevertheless address problems or situations sufficiently similar to those encountered at the CERCLA site to indicate their use is well-suited to the particular site. A requirement must be both relevant and appropriate to be designated an ARAR. If no ARAR addresses a particular situation, or if an ARAR is insufficient to protect human health or the environment, then nonpromulgated standards, criteria, guidance, and to-be-considered (TBC) advisories may be used to provide a protective remedy.

On-site response actions may proceed without obtaining permits pursuant to CERCLA Section 121 (e). This permit exemption allows the response action to proceed in an expeditious manner, free from potential lengthy delays of approval by administrative bodies. This permit exemption applies to all administrative requirements, whether or not they are actually styled as "permits." Thus, administrative requirements can not be ARARs.

Off-site remedies must comply with all applicable laws and must obtain all necessary permits and fulfill all administrative procedures.

ARARs are identified on a site-specific basis from information about specific chemicals at the site, specific actions that are being considered as remedies, and specific features of the site location. There are three categories of ARARs:

- Chemical-specific ARARs are numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. They are used to determine acceptable concentrations of specific hazardous substances, pollutants, and contaminants in the environment;

- Location-specific ARARs are restrictions placed on the concentrations of hazardous substances or the conduct of activities solely because the site occurs in a special location, such as a wetland or floodplain; and
- Action-specific ARARs are technology or activity-based requirements or limitations on actions taken with respect to hazardous waste.

The Federal ARARs are summarized below ... The State ARARs, are summarized below... "

#### **U&A Response**

The suggested text generally describing ARARs has been incorporated in Section 2.13.2. ARARs for the remediation of ACM are discussed in Section 2.13.3. ARARs for CAOCs 1, 8A, and 10 are discussed in Section 2.13.4. The language stating that ARARs are not triggered at sites that require no further action has been incorporated in the last paragraph of Section 2.13. 1.

#### **EPA Comment**

25. Section 2.13.3 Preferred Alternative for Responding to Potential Health Risks at CAOC 1 and CAOC 8A, page 2-62  
Compliance with ARARs

It is stated that ARARs have not been identified for PAHs and PCBs in soils at CAOC 1 and CAOC 8A. Please note that last year Arizona passed soil clean-up standards. Please contact the ADEQ representative for the citation.

#### **U&A Response**

U&A has obtained the appropriate citation from ADEQ and the following language has been inserted in Section 2.13.4

"Under the authority of Arizona Revised Statutes Section 49-151 and Section 49-152, ADEQ has established Department-wide standards applicable to soil remediation activities. The Amended Soil Remediation Rules were adopted in Arizona Administrative Code Title 18, Chapter 7, Article 2, Interim Soil Remediation Standards (Sections R18-7-201 through R18-7-209) in 1996. These regulations are considered applicable.

The regulations allow soil remediation activities that attain one of three standards (Section R18-7-203): 1) remediation to background levels; 2) remediation to the Health Based Guidance Levels (HBGLs) presented in Appendix A of Title 18, Chapter 7, Article 2; or 3) remediation to levels derived from a site-specific risk assessment."

#### **EPA Comment**

26. Section 2.14.2 Selected Remedy for Potential health Risks at CAOC 1 and CAOC 8A, page 2-67  
In the last paragraph, it is stated, "In the future, the language added to the master plan could incur costs related to future soil investigations, revised risk assessments, and possible remedial activities. These potential costs cannot be estimated at the present time" Please note that the activities mentioned would likely result only after the ROD has been amended; thus, the cost estimates would be part of the amended ROD and not necessarily part of this ROD.

#### **U&A Response**

The following text has been added to Section 2.13.4 and the last paragraph of Section 2.14.2:

"However, the activities associated with these costs would likely result only after the ROD has been amended; thus, the cost estimates would be part of the amended ROD and not part of the present ROD."

**EPA Comment**

27. Section 2.15.2 Statutory Determination for Selected Remedy for ACM in Soils, page 2-68  
Location-Specific ARARs

A string of citations is provided with little or no discussion of how they apply to the remedy. Please identify which particular sections of the regulations apply to the remedy and why they apply to the remedy.

**U&A Response**

The text of Section 2.15.2 has been revised to clarify that the cited regulations and laws do not apply to the selected remedy.

**EPA Comment**

28. Section 2.15.2 Statutory Determination for Selected Remedy for ACM in Soils, page 2-69  
Action-Specified ARARs

This section should incorporate the following comments:

- a) Sections 61.145 and 61.154: Do these sections include administrative requirements? Only substantive requirements, not administrative requirements, need to be complied with for actions that take place on-site. For actions that take place off-site, both substantive and administrative requirements need to be complied with.

**U&A Response**

The text has been revised to clarify which of the requirements are administrative and which of the comments are substantive.

- b) Are there any RCRA requirements or state equivalent RCRA requirements that would apply to the remedy i.e., fugitive dust limits; treatment, storage or disposal requirements, etc.?

**U&A Response**

The text has been revised to clarify that there are no RCRA requirements or state equivalent RCRA requirements that would apply to the remedy for ACM.

**EPA Comment**

29. Section 2.15.2 Statutory Determination for Selected Remedy for ACM in Soil, page 2-69  
Other Criteria to Be Considered (TBC)

Please include a discussion of what a TBC is before listing the TBCs.

**U&A Response**

The text has been revised as follows:

"In implementing the selected remedy, U.S. EPA and the State have agreed to consider procedures that are not legally binding. This category of to-be-considered (TBC) procedures consists of advisories, criteria, or guidance that were developed by EPA, other federal agencies, or states that may be useful in developing CERCLA remedies. Such criteria are used if no ARAR addresses a particular situation, or if an ARAR is insufficient to protect human health or the environment. One such criterion has been identified as a potential TBC."

**EPA Comment**

30. Section 2.15.2 Statutory Determination for Selected Remedy for ACM in Soil, page 2-71  
In the second paragraph after the bullets, it is stated that "Community acceptance will be evaluated after the public has commented on the alternative." Please note that the proposed plan must go through the public comment period before the ROD can be signed. After the public comment period, community acceptance of the selected remedy must be documented in the ROD.

**U&A Response**

The text has been amended to note the proper sequence of public review for the Proposed Plan and the ROD.

**EPA Comment**

31. Section 2.15.3 Statutory Determinations for Selected Remedy for Potential Health Risks at CAOC 1 and CAOC 8A, page 2-71

The first paragraph states, "Compliance with the additional language in the base master plan would ensure that the future development of the CAOCs would not result in unacceptable risks." How will the BMP be used so that compliance with the land use restrictions are enforced?

**U&A Response**

The text has been revised as follows:

"The institutional controls would restrict the land use of CAOC 1 and CAOC 10 to industrial/commercial use and CAOC 8A to the current use. The institutional controls would be implemented through the Base Master Plan, which would reference the OU2 ROD. Additions to the Base Master Plan would include a map indicating the locations of the former disposal areas in CAOC 8A. The Base Master Plan would require that any changes in activities or land use in these CAOCs be coordinated through and reviewed by the MCAS Yuma Environmental Department. In the event that the Navy plans any future changes in land use at CAOCs 1, 8A, or 10, U.S. EPA would be requested to re-evaluate the remedy in light of the intended land use. If the change in land use is not compatible with the remedy, the remedy may be changed pursuant to CERCLA Section 120 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) Section 300.430 (f)(4)(iii) and the ROD may be amended."

**EPA Comment**

32. Figure 2-1 CAOC 1: Feature and Boring Locations Map 1 through Figure 2-28

CAOC 18: Feature and Boring Location Map

These figures show too much detail. It is recommended that all of the figures be removed with the exception of the CAOCs where a remedy is being implemented (CAOC 1,4,7,8A,9, and 10). The figures of the CAOCs where a remedy is being implemented should only show the features relevant to the remedy. For example, the location of the ACM-areas should be shown for CAOC 4 and the location of the former disposal pits should be shown for CAOC 8A.

**U&A Response**

The figures have been deleted/revised as requested.



Arizona Department of Environmental Quality (ADEQ) Review  
of the Draft Record of Decision for Operable Unit 2  
Marine Corps Air Station, Yuma, Arizona  
Report Dated July 31, 1996  
Comments Dated October 1, 1996

**ADEQ Comment**

1. 1.2 Site Name and Location (page 1-1)

A Federal Facility Agreement (FFA) was signed by the U.S. Environmental Protection Agency (U.S. EPA), the Department of the Navy (Navy), and the Arizona Department of Environmental Quality (ADEQ) in 1990 to establish a frame work and schedule for implementing environmental investigations and appropriate remedial actions tinder the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Comments: The final FFA was signed in January, 1992. Please correct the date at this location and other locations as appropriate throughout the document.

**U&A Response**

The text has been corrected as requested.

**ADEQ Comment**

2. 1.4 Assessment of the Site (page 1-2)

Based on the RI, U.S. EPA, ADEQ and the Navy agreed that 13 of the CAOCs require no further action.

Comment: The final status of CAOC 10, and other PAH sites, has not yet been determined. Additional comments may be submitted following review of recent sampling data.

**U&A Response**

Based on the August 1996 sampling effort at CAOC 10, the number of sites requiring no further action is now 12. Institutional controls will be implemented at CAOC 10. In addition, in response to U.S. EPA's request for further characterization of CAOC 10, the following text has been added to Section 2.4:

"Investigations performed at MCAS Yuma include the Remedial Investigation Feasibility Study (RI/FS)(JEG, 1996), a supplemental sampling program at CAOC 10 (Uribe, 1996b), Federal Facility Agreement Assessment Program (FFAAP), and underground storage tank investigations (JEG, 1995b). In addition, further characterization of CAOC 10 will be performed in 1997."

**ADEQ Comment**

3. 1.5 Description of the Selected Remedy, Alternative 2-Additions to the Base Master Plan (page 1-5)

It is expected that this alternative would be acceptable by the state and the community.

Comment: Please provide justification or clarification to this statement.

**U&A Response**

The text of Section 1.5 has revised been as follows:

The state has indicated that Alternative 2 would be acceptable if the substantive requirements of R18-7-208 and R18-7-209 are met. Based on interaction with the Restoration Advisory Board (RAB), Alternative 2 is expected to be accepted by the community."

**ADEQ Comment**

4. 1.6 Statutory Determination (page 1-7)

Comment: Please correct the ADEQ signature block as follows - Russell F. Rhoades, Director, Arizona Department of Environmental Quality.

**U&A Response**

The spelling of Russell F. Rhoades' name has been corrected as requested.

**ADEQ Comment**

5. 2.7 Highlights of Community Participation (page 2-13)

Comment: General information on the community relations program, and contact names is unnecessary. Please remove this portion.

**U&A Response**

The text has been removed as requested

**ADEQ Comment**

6. 2.9 Site Characteristics (page 2-15)

Comment: In general, the information presented in this section should be simplified. Individual site characteristics should be incorporated in the general site descriptions presented in section 2.6. Text briefly summarizing significant sample results should be developed in place of the numerous data tables currently present in this section.

**U&A Response**

In conformance with a similar U.S. EPA comment (Specific Comment 13), the text of Sections 2.9.1 through 2.9.18 has been deleted, with the exception of the closing paragraphs that summarized the significant sample results; these summaries have been incorporated into Sections 2.6.2 through 2.6.19. However, since U.S. EPA requested corrections to a data summary table (Specific Comment 14), these tables have been retained in the Record of Decision. Note that the tables have been moved to the end of the ROD, behind the Tab labeled "Tables".

**ADEQ Comment**

7. Table 2-2 Analyte Groups and Associated Methods (page 2-17)

Comment: The information provided in this table is not necessary in the ROD. Please remove the table.

**U&A Response**

Table 2-2 has been removed as requested.

**ADEQ Comment**

8. 2.10.3 Exposure Assessment (page 2-40)

Comment: The state Amended Soil Remediation rules discussed in comment 10 must be considered in evaluating default exposure parameters described in this section.

**U&A Response**

The following text has been added to Section 2.10.3

"Note that the Arizona Health Based Guidance Levels (HBGL) discussed in the ARAR discussion in Section 2.13.3 are derived using the assumption that incidental ingestion of soil contaminants is the only significant exposure pathway. Therefore, the RBC values (See Section 2.10.5) are more conservative than the HBGL values. HBGL values are derived by ADEQ for residential and non-residential scenarios that are analogous to the future use industrial/commercial and residential scenarios used in developing RBC values.

**ADEQ Comment**

9. 2.15 Statutory Determinations (page 2-67)

Comments: A brief description of the ARARs determination process, and a table presenting all ARARs should be added to this section.

**U&A Response**

U.S. EPA requested a similar edit for Section 2.13 (Specific Comment 25). See the response to U.S. EPA Specific Comment 25 for the additional text concerning the ARARS determination process. The requested table has been incorporated as Table 2-12 of the Final Record of Decision.

**ADEQ Comment**

10. 2.15.3 Statutory Determinations for Selected Remedy for Potential Health Risks at CAOC 1 and CAOC 8A (page 2-71) ARARs have not been identified for PAHs and PCBs in soils at CAOC 1 and CAOC 8A.

Comment: As stated in previous correspondence regarding the OU2 Feasibility Study (FFU97.021), ADEQ has established Department-wide standards applicable to soil redemption activities. The amended soil Remediation Rules should be considered an Applicable, Relevant and Appropriate Requirement (ARAR). Please make the appropriate changes throughout the ROD.

**U&A Response**

The text of sections 2.13.3 and 2.15.3 have been amended as follows:

"Under the authority of Arizona Revised Statutes Section 49-151 and Section 49-152, ADEQ has established Department-wide standards applicable to soil remediation activities. The Amended Soil Remediation Rules were adopted in Arizona Administrative Code Title 18, Chapter 7, Article 2, Interim Soil Remediation Standards (Sections R18-7-201 through R18-7-209) in 1996. These regulations are considered applicable.

The regulations allow soil remediation activities that attain one of three standards (Section R1 8-7-203): 1) remediation to background levels; 2) remediation to the Health Based Guidance Levels (HBGLs) presented in Appendix A to Title 18, Chapter 7, Article 2; or 3) remediation to levels derived from a site-specific risk assessment. HBGL values for the PAHs and PCBs detected at CAOC 1, 8A, and 10 are presented in Table 2-7. "

MCAS Yuma Environmental Department Review Comments for  
Draft Record of Decision for Operable Unit 2  
Marine Corps Air Station, Yuma, Arizona  
Report Dated July 31, 1996  
Comments Dated October, 1996

**MCAS Yuma Comment**

1. Page 1-1, Section 1.2, first paragraph, a reference to when the Navy/Marine Corps took control of the Air Station from the Air Force is needed.

**U&A Response**

The following sentence has been added to Section 1.2

"In January 1959, the Station and its associated range facilities were transferred to the U.S. Navy."

**MCAS Yuma Comment**

2. Page 1-1, Section 1.2, second paragraph, OU3 has been identified in the OU1 RI report and should also be identified in this document.

**U&A Response**

OU3 has not yet been defined. Therefore, OU3 is not discussed in the ROD.

**MCAS Yuma Comment**

3. Page 1-3, Section 1.4, second bullet item, should identify that the risk is due to the presence of PAC's and PCB's in the soil. Should also reference that sampling was not performed in the landfill.

**U&A Response**

The following paragraph (or similar language) has been incorporated into Section 1.4 (page 1-3) and Section 2.10.6 (page 2-23) of the Final Record of Decision for Operable Unit 2, MCAS Yuma, to respond to this comment:

"CAOC 8A: Intrusive sampling was not conducted at the southeast station landfill during the RI. Based on the human health risk assessment, it was concluded that a landfill cap was not required under the current land use. However, since the interior of the landfill was not investigated during the RI, the risk from exposure to the landfill interior is unknown."

The classes of chemicals responsible for the risk (i.e., PAHs and PCBs) are discussed in the context of the more detailed risk assessment discussions in Section 2.10.6.

**MCAS Yuma Comment**

4. Page 1-6, Section 1.6, last paragraph on the page, there should be some criteria placed in the base master plan which is acceptable to EPA/ADEQ to evaluate the planned activities or land use changes in CAOCs 1 and 8A.

**U&A Response**

The following text has been incorporated in Section 1.6:

"The institutional controls would restrict the land use of CAOC 1 and CAOC 10 to industrial/commercial use and CAOC 8A to the current use. The institutional controls would be implemented through the Base Master Plan, which would reference the OU2 ROD. Additions to the Base Master Plan would include a map indicating the locations of the

former disposal areas in CAOC 8A. The Base Master Plan would require that any changes in activities in these CAOCs or land use changes be coordinated through and reviewed by the MCAS Yuma Environmental Department. In the event that the Navy plans any future changes in land use at CAOCs 1, 8A, or 10, U.S. EPA will be requested to re-evaluate the remedy in light of the intended land use. If the change in land use is not compatible with the remedy, the remedy may be changed pursuant to CERCLA Section 120 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) Section 300.430(f)(4)(iii) and the ROD may be amended.

If the land is transferred to a non-federal agency, the Department of the Navy would file a Voluntary Environmental Mitigation Use Restriction (VEMUR), indicating that the property has been remediated to less than residential levels and that the property cannot be used for residential purposes in the future. The VEMUR would be recorded in accordance with Arizona Revised Statutes Section 49-152, as implemented in Arizona Administrative Code Sections R18-7-206 (D)(2)(a) and R18-7-207(A).

The rationale for selecting Alternative 2 as the preferred alternative for potential health risks at CAOCs 1, 8A, and 10 was based on the U.S. EPA criteria listed in Section 1.5. Alternative 2 would be protective of human health and the environment, comply with the State of Arizona and federal requirements that are legally applicable or relevant and appropriate to the remedial action, and be cost effective. Because Alternative 2 would result in hazardous substances remaining on site, a five-year review will apply to this action."

**MCAS Yuma Comment**

5. Page 1-7, The Marine Corps did not sign the FFA, therefore, the signatures for the ROD should be of the same agencies as the FFA. However, if necessary. The MCAS Yuma Commanding Officer's signature would be appropriate.

**U&A Response**

Southwest Division has determined that the MCAS Commanding Officer, Colonel C. J. Turner, is to be the Department of the Navy signatory.

**MCAS Yuma Comment**

6. Page 2-7, Section 2.6.4, CAOC 3 is not completely paved.

**U&A Response**

The typographical error has been corrected and the text now reads, "The original fenced area of CAOC 3 covered approximately 0.3 acre of unpaved land."

**MCAS Yuma Comment**

7. Page 2-7, Section 2.6.5, no municipal waste was disposed at CAOC 4. Municipal waste should be reworded to station household waste or words to that effort.

**U&A Response**

The text has been revised to clarify that all of the municipal waste was generated at MCAS Yuma. Note that the term "municipal waste", as used by U.S. EPA, refers to waste streams that contain household waste. Therefore, "municipal waste" refers to the contents of the waste stream and does not necessarily imply that the waste originated from a municipality.

**MCAS Yuma Comment**

8. Page 2-8, Section 2.6.7, same discussion as above concerning municipal waste.

**U&A Response**

The text has been revised to clarify that all of the municipal waste was generated at the Station.

**MCAS Yuma Comment**

9. Page 2-8, Section 2.6.9, same discussion as above concerning municipal waste.

**U&A Response**

The text has been revised to clarify that all of the municipal waste was generated at the Station.

**MCAS Yuma Comment**

10. Page 2-9, Section 2.6.9, Facilities Management Department should be able to determine a period when the pits were backfilled and housing units were developed.

**U&A Response**

The Facilities Management Department was unable to provide the date for the back pits. Therefore, this edit was not made.

**MCAS Yuma Comment**

11. Page 2-9, Section. 2.6.10, DRMO does not use this area as a salvage yard or as an overflow area.

**U&A Response**

The text has been edited to remove the statement concerning use of the area as a salvage yard or as an overflow area.

**MCAS Yuma Comment**

12. Page 2-10, Section 2.6.14, Chemical weapons were not used at MCAS Yuma. Change any reference of "chemical weapons" to "simulation of chemical weapons" or words to that effect.

**U&A Response**

References to chemical weapons have been deleted from the text.

**MCAS Yuma Comment**

13. Page 2-12, Section 2.6.19, waste stored in the drums was I.D.W. and PPE (see page 22-1 of the OU2 RI report).

**U&A Response**

The text has been revised to include the contents of the drums.

**MCAS Yuma Comment**

14. Page 2-12, Section 2.7, change the Public Affairs address to the following:  
United States Marine Corps  
JPAO  
Box 99113  
Yuma, AZ 85369-9113  
(520) 34[9?]1-2275

**U&A Response**

U.S. EPA and ADEQ requested that Section 2.7 be significantly abridged. The Public Affairs address is no longer included in the text.

**MCAS Yuma Comment**

15. Section 2.7, Personal names should not be used because people change jobs. Position titles and project names should be used in place of names.

**U&A Response**

EPA and ADEQ requested that Section 2.7 be significantly abridged. The position titles and project names have been deleted from Section 2.7.

**MCAS Yuma Comment**

16. Pages 2-21a through 2-24g, photocopies of the table are hard to read. Include a clean table in the final version of the ROD.

**U&A Response**

Clean copies are provided.

**MCAS Yuma Comment**

17. Page 2-26, Section 2.9.1. change RFA Units to FFAAP Units.

**U&A Response**

At the request of U.S. EPA and ADEQ, this section has been condensed and combined with Section 2.6.2. The reference to RFA Units was removed when the section was condensed.

**MCAS Yuma Comment**

18. Page 2-41, Section 2.10.3 "two-year tour of duty" is not an appropriate designation. Marine Corps policy has changed over the years such that personnel may be assigned to a duty station up to six years. Please change "two-year tour of duty" to "duty assignment."

**U&A Response**

The text has been edited as requested.

**MCAS Yuma Comment**

19. Page 2-46, Section 2.10.6.5, a glossary should be added so that certain terms, such as "excess cancer risk" can be defined.

**U&A Response**

"Excess cancer risk" is defined in Section 2.10.5. Because Section 2.10 has been greatly abridged in accordance with a discussion between U.S. EPA, Southwest Division, and U&A on October 10, 1996, Section 2.10.6.5 is no longer a component of the ROD. The abridged version of Section 2.10 keeps all references to "excess cancer risk" closer to the definition of the term.

**MCAS Yuma Comment**

20. Page 2-49, Section 2.11.1, soil screening criteria should be defined.

**U&A Response**

Based on a discussion between U.S. EPA, Southwest Division, and U&A on October 10, 1996, Section 2.11 has been greatly abridged, and in the present version of the ROD, Section 2.11 is less than one page of text. The revised text states that; "Soil screening criteria are discussed in Section 4.16 of the RI Report and derived in Appendix Q of the RI Report (JEG, 1996). " A full discussion of the screening criteria is beyond the scope of the condensed discussion of environmental risk that is now included in the ROD.

**MCAS Yuma Comment**

21. Page 2-50, top two lines are duplicate lines of the previous paragraph.

**U&A Response**

Text has been corrected.

**MCAS Yuma Comment**

22. Page 2-50, Section 2.11.2, soil toxicity criteria should be defined.

**U&A Response**

The phrase "soil toxicity criteria" was an inconsistent name for "soil screening criteria". The text of Section 2.11 has been revised to consistently use "soil screening criteria".

**MCAS Yuma Comment**

23. Page 2-51, Section 2.11.6, this section should repeat the Ecological Risk Assessment on page 9-5 of the OU2 RI Report.

**U&A Response**

In accordance with a discussion between U.S. EPA, Southwest Division, and U&A on October 10, 1996, Section 2.11.1 through 2.11.20 have been significantly abridged into Section 2.11. The level of detail on page 9-5 of the OU2 RI Report is no longer appropriate to the abridged Section 2.11

**MCAS Yuma Comment**

24. Pages 2-64 through 2-66, photocopies of the tables are hard to read. Include clean tables in the final version of the ROD.

**U&A Response**

Clean copies are provided.

**MCAS Yuma Comment**

25. Page 2-67, Section 2.14.2, both bullet items, how will MCAS Yuma know the risks involved in changes in land use or activities planned in CAOCs 1 and 8A.

**U&A Response**

The text has been revised as follows:

"Under the selected alternative, Alternative 2, the following institutional controls would be implemented through additions to the Base Master Plan:

- CAOC 1 and 10: In order to control the potential risk from exposure to PAHs in soils, the institutional controls would restrict the land use of CAOC 1 and CAOC 10 to industrial/commercial use. A change in land use from industrial to residential use would require re-evaluation of the remedy. The institutional controls would be implemented through the Base Master Plan, which would reference the OU2 ROD. The Base Master Plan would require that any changes in activities or land use at CAOC 1 or CAOC 10 be coordinated through and reviewed by the MCAS Yuma Environmental Department. The locations of the PAH detections would also be documented in the Base Master Plan.
- CAOC 8A: In order to control the potential risk from the exposure to the landfill interior, the institutional controls would restrict the land use of CAOC 8A to the current use. A change in land use at CAOC 8A involving any activities that may disrupt and expose the landfill interior would require re-evaluation of the remedy. The institutional controls would be implemented through the Base Master Plan, which would reference the OU2 ROD. The Base Master Plan would, require that any changes in activities or land use at CAOC 8A be coordinated through and reviewed by the MCAS Yuma Environmental Department. The locations of the former disposal areas and the



locations of the PCB detections will also be documented in the Base Master Plan.

In the event that the Navy plans any future changes in land use at CAOC 1, CAOC 8A, or CAOC 10, EPA would be requested to re-evaluate the remedy in light of the intended use changes. For CAOC 1 or CAOC 10, a change in land use from industrial use to residential use would require re-evaluation of the remedy. For CAOC 8A, a change in land use involving any activities that may disrupt and expose the landfill interior would require re-evaluation of the remedy. At the time of these future activities, further investigation may be undertaken in order to determine if remediation is required and if the ROD must be amended. If the change in land use is not compatible with the remedy, the remedy may be changed pursuant to CERCLA Section 120 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) Section 300.430 (f)(4)(iii) and the ROD may be amended. If the land is transferred to a non-federal agency, the Department of the Navy would file a Voluntary Environmental Mitigation Use Restriction (VEMUR)."

**MCAS Yuma Comment**

26. Page 2-70, Utilization of Permanent Solutions and Alternative Technologies to the Maximum, Extent Practicable, Community impacts bullet items, what is the impact on the community in filling Wellton landfill.

**U&A Response**

Impacts on filling the Wellton landfill are considered to be out of the scope of the OU2 Feasibility Study and ROD. Because the Wellton landfill is a permitted facility, general community impacts of disposal at the facility are expected to be dealt with in the context of the facility's operating permit.

**MCAS Yuma Comment**

27. Page 5-2, change RFA to FFAAP.

**U&A Response**

At U.S. EPA and ADEQ request, Sections 2.9.1 through 2.9.18 and Sections 2.6.1 through 2.6.19 have been condensed and combined into a revised Section 2.6.1 through 2.6.19. The reference to RFA Units was removed when the sections were condensed. Therefore, "RFA" is no longer needed in the glossary.

Review Comments from Charles Saltzer, MCAS Yuma for  
Draft Record of Decision for Operable Unit 2,  
Marine Corps Air Station, Yuma, Arizona  
Report Dated July 31, 1996  
Comments Dated September 17, 1996

**MCAS Yuma Comment**

1. Page 1-6 What base master plan would be revised?

**U&A Response**

The text has been revised to emphasize that the institutional controls will be implemented through the MCAS Yuma Base Master Plan.

**MCAS Yuma Comment**

2. Page 2-12 Par. 2.7 Lt. Connor is not the Public Affairs Officer. His replacement is 1st. Lt. Jimenez.

**U&A Response**

In response to U.S. EPA and ADEQ comments, the text of Section 2.7 has been significantly abridged. The revised version of 2.7 no longer includes the name of the Public Affairs Officer.

**MCAS Yuma Comment**

3. Page 2-41 Par. 2.10.3 Exposure Assessment. Is it reasonable to consider re- development of areas for residential housing? With Yuma County having only MCAS Yuma as an airport the property would not be ever zoned for residential development.

**U&A Response**

Use of residential exposure scenarios is a standard practice in developing risk assessments for CERCLA sites. In addition, residential development is a reasonable exposure scenario for land at MCAS Yuma because this scenario includes use of the land for military housing.

**MCAS Yuma Comment**

4. Figure 1-1 Location Map The Station boundary is not represented correctly. This needs to be corrected or someone in the public comment stages could state that not all areas of the Station were investigated thus the findings are invalid.

**U&A Response**

Based on a discussion with the MCAS Yuma Environmental Department **2**, it was decided that changes to the figure are not warranted. Note that slight inaccuracies in the Station boundary on Figure 1-1 would not impact the validity of the ROD for OU2, which is only concerned with the 18 CAOCs identified as the components of OU2 in previous studies. Prior documents should have evaluated the full extent of potential contamination on Station property.

**2** Phone conversation between S. Knott of U&A and L. Leake at MCAS Yuma, December 2, 1996.

EPA Comments on the  
Draft Final Record of Decision (ROD) for Operable Unit 2  
Marine Corps Air Station, Yuma, Arizona  
Report Dated December 20,1996  
Comments Dated February 5,1997

**General Comments**

**EPA Comment**

1. In EPA's General Comment #3 on the Draft ROD, EPA requested that the Navy propose language that will be added to the Base Master Plan (BMP) for the institutional controls at CAOCs 1, 8A and 10. This comment was not adequately addressed. For the institutional controls at CAOCs 1, 8A and 10, EPA requests the following:
  - 1) The Navy propose the language that will go in the BMP and that EPA approve the language.

**U&A Response**

See response to General Comment 1, 3).

- 2) The Navy propose the location where the language will go in BMP and that EPA approve the location.

**U&A Response**

The Navy proposes to incorporate the language in Chapter 8, Proposed Land and Facility Use Plans, of the BMP.

- 3) the language and location of the language for the BMP be included as an appendix to the ROD. Alternatively if the language can not be agreed upon before the ROD is finalized, it must be clearly stated in the ROD that EPA will approve the language and the location of the language for the BMP.

**U&A Response**

The following text has been added to Sections 1.5, 1.6, 2.12.5, 2.14.2 and 2.15.3, specifying that U.S. EPA will be asked to approve the language and the location of the language for the BMP.

Before the land use restrictions are incorporated in the BMP, the Navy will obtain the approval of the U.S. EPA for the language of the restrictions and the location in the BMP at which the approved language will be incorporated.

**EPA Comment**

2. In EPA's Specific Comment #31 on the Draft ROD, EPA asked "How will the BMP be used so that compliance with the land use restrictions are enforced?". This comment was not adequately addressed. Please provide a brief description of how the BMP is used for planning purposes. For example, if a construction activity was proposed for CAOC 10, what process would the Base go through and how would the BMP be used. This description should be included in the ROD.

**U&A Response**

The following excerpt from the MCAS Yuma BMP explains how the BMP is used:

- 2.0 Introduction  
Purpose of the Plan

Guidance for Masterplanning of Naval and Marine Corps installations is contained in NAVFAC INST 11010.63B, dated October 20, 1982. The purpose is to provide a comprehensive and practical planning process that will support current and projected mission requirements; improve operational capabilities; and protect infrastructure investments, resources and the environment. The Plan demonstrates the commitment of the Navy and the Marine Corps to the implementation of Department of Defense (DOD) and other federal policies.

The activity master planning process has been designed to ensure the logical, orderly, and efficient use of land and facility resources, and of military construction funding. The process includes mechanisms to meet operation, safety and environmental requirements in the siting and designing of activity projects.

This Masterplan of the Marine Corps Air Station, Yuma, Arizona provides the Navy and Marine Corps with realistic and orderly development guidance for the maintenance and further improvement of the installation. It is a decision-making tool for all levels of command that addresses current issues and provides the necessary background for planning and review. A preferred development program analysis is recommended that has been selected by the Navy and Marine Corps as the most viable alternative, taking into consideration the Station's current situation and the planned future of both the Station and its environment. This Plan has been based upon information provided by the Station, and these recommendations reflect the evaluations, judgments and decisions of base personnel.

The Navy will also use Voluntary Environmental Mitigation Use Restrictions (VEMURs) to restrict the land uses at CAOCs 1, 8A, and 10. The following language has been added to Sections 1.5, 1.6, 2.12.5, 2.14.2, and 2.15.3:

The institutional controls would be implemented through the MCAS Yuma Base Master Plan, which would reference the OU2 ROD. Additions to the Base Master Plan would include a map indicating the locations of the former disposal areas in CAOC 8A. In addition, the Navy would execute and record Voluntary Environmental Mitigation Use Restrictions (VEMUR) in accordance with and substantially in the form set out at Arizona Revised Statutes, Section 49-152, where appropriate. Each VEMUR would state that it was executed and recorded by the federal government "for itself only, and not as a covenant running with the land". In addition, the VEMUR would state that:

- "a. No interest in real property is created by the VEMUR;
- b. The State's approval of any VEMUR notice, or cancellation of same, is to verify the propriety of the format of the notification, and the accuracy of any, assertion that the cleanup conducted is protective for non-residential uses."

#### **EPA Comment**

3. For information purposes, please provide a copy or relevant sections of the BMP to EPA.

#### **U&A Response**

Copies of relevant sections of the BMP have been included as an attachment to this response to comments.

#### **Specific Comments**

##### **EPA Comment**

1. Section 1.5 Description of the Selected Remedy, page 1-6

## Alternative 2 - Institutional Controls

Please revise the second sentence on this page as follows, "In the event that the Navy plans any future changes in the land use at CAOCs 1, 8A, and 10, the Navy in consultation with U.S. EPA and ADEQ would re-evaluate the remedy in light of the intended land use." Please also revise the sentence in Sections 1.6, 2.12.5, 2.14.2 and 2.15.3.

### U&A Response

The text has been revised as requested.

### EPA Comment

2. Section 2.6-11 CAOC 10: Ordnance Munitions Disposal Area, page 2-12

This section must be updated after the additional PAH sampling is completed at CAOC 10. The additional characterization work must be completed before the ROD is finalized.

### U&A Response

As requested, the discussion of sampling at CAOC 10 has been revised using the additional information obtained in February of 1997. The following text replaces the last three sentences of Section 2.6.11:

Follow-up sampling programs in August 1996 and February 1997 (U&A, 1996d; U&A, 1997) demonstrated the presence of PAHs over a wider area than indicated by the RI. Several sampling locations had total PAH concentrations an order of magnitude higher than were detected in the RI. Figure 2-10 shows the total PAH concentrations detected in the August 1996 and February 1997 samples with the isoconcentration contours defined in the RI Report. Although the August 1996 and February 1997 data support the presence of elevated PAH concentrations at the four areas of elevated PAHs identified in the RI Report, the later data also indicate that elevated PAH concentrations are present at locations that do not correspond to features identified based on aerial photographs or geophysical anomalies.

### EPA Comment

3. Section 2.10.6 Summary of Risks at individual CAOCs page 2-24

CAOC 10: Ordnance Munitions Disposal Area

Please note that this section will have to be revised after the additional PAH sampling is completed. Also, it is inconsistent to calculate risk using EPA PRGs when the risk at the other CAOCs was calculated using RBCs. The reference to PRGs should be discussed with EPA before it is revised.

### U&A Response

As requested, the discussion of risk for CAOC 10 has been revised using the additional information obtained in February of 1997. The second paragraph of the discussion of CAOC 10 has been revised as follows:

Based on data from the August, 1996 and February, 1997 field investigations and the RBCs derived in the RI, the excess cancer risk from PAHs for the residential exposure scenario was recalculated as  $4.6 \times 10^{-4}$  and for the industrial scenario,  $1.5 \times 10^{-4}$  (U&A, 1997). The recalculated industrial excess lifetime cancer risk is at the upper end of the range of risks that are potentially acceptable for industrial exposure scenarios.

The RI Risk-Based Criteria (RBCs) used to calculate carcinogenic risk were developed in

1993 using U.S. EPA exposure factors. U.S. EPA's dermal exposure factors have since been revised. If the RBCs were calculated with the current (1996) EPA-approved factors, the RBCs for PAHs would be identical to U.S. EPA Preliminary Remediation Goals (PRGs). Using the same data and calculating the risks using PRGs, the industrial and residential excess lifetime cancer risks are  $7.0 \times 10^{-5}$  and  $2.9 \times 10^{-4}$ , respectively. The industrial excess lifetime cancer risk calculated with PRGs is in the middle of the range of risks that are acceptable for industrial exposure scenarios.

As discussed in Section 6.3 of the Report of Supplemental Soil Sampling Program for Polycyclic Aromatic Hydrocarbons at CAOC 10, Operable Unit 2, MCAS Yuma, April 8, 1997 (prepared by Uribe & Associates), the most significant difference between the RBC values and PRG values are the default exposure values for dermal exposure. The RBC values use the EPA-approved dermal exposure factors that were current in 1993, while the PRG values used the EPA-approved dermal exposure factors that are presently in effect. U&A believes that it is appropriate to include the RBC-derived risk values in the discussion of CAOC 10 for the purpose of consistency with the risk values reported for the other CAOCs, while also reporting the PRG-derived risk numbers to support risk management decisions.

For the other CAOCs at OU2, use of the RBC values has demonstrated the absence of significant risk for industrial exposure scenarios. Since the current PRGs include a smaller exposure component for dermal exposure, revision of the hazard indices and cancer risks for the other CAOCs would result in risks that were equal to or less than the risks obtained using the RBC values. Therefore, the use of PRGs to re-calculate the hazard indices and excess cancer risks for the other CAOCs would not provide additional protection to human health, since the previous calculations have already demonstrated that site conditions are sufficiently health protective.

MCAS Yuma Review Comments on the  
Draft Final Record of Decision (ROD) for Operable Unit 2  
Marine Corps Air Station, Yuma, Arizona  
Report Dated December 20,1996  
Comments Dated February 24,1997

**MCAS Yuma Comment**

1. Paragraph 2.6.5, page 2-8, please define municipal wastes or find new term.

**U&A Response**

The text has been revised as follows:

"This area was used for burning or burying municipal waste (household waste) generated at MCAS Yuma."

**MCAS Yuma Comment**

2. Paragraph 2.6.7, page 2-9, please define municipal sewage or find new term.

**U&A Response**

The text has been revised as follows:

"Treated industrial sewage and municipal sewage (domestic sewage) from MCAS Yuma.."

**MCAS Yuma Comment**

3. Paragraph 2.8, page 2-16, in the last paragraph on the page, remove the word "be" from the sentence ". . . they are still be referred. . "

**U&A Response**

Text has been corrected as requested.

**MCAS Yuma Comment**

4. Paragraph 2.10.3, page 2-19, were civilian employees included in the exposure scenarios for current uses at MCAS Yuma for CAOCs that are currently industrial /commercial.

**U&A Response**

Civilian employees were included in the future industrial /commercial use scenarios; the civilian employees are assumed to have a 25-year exposure period in comparison to the three-year exposure period of the military worker. The text has been revised to emphasize that risk management decisions were made on the basis of the future use scenarios because the use of these scenarios was more conservative than the use of the current use scenarios.

The following paragraph has been inserted following the bullet items on the bottom of page 2-19:

"Exposure scenarios were developed for both current and future land uses at MCAS Yuma. Because the future land use scenarios involve a higher degree of exposure to chemicals at MCAS Yuma, risk management decisions were made on the basis of the future use scenarios. Use of the future use scenarios, therefore, provided a more conservative estimate of risk."

In addition, the following sentence has been inserted after the fourth sentence of the first complete paragraph on page 2-20.

"Similarly, the industrial exposure scenario for future use includes a 25-year exposure period, rather than the three-year exposure period for military workers."

**MCAS Yuma Comment**

5. Paragraph 2.10.6, page 2-24,  $2.2 \times 10^{-4}$  is not within the  $10^{-4}$  to  $10^{-6}$  risk range as set forth by the EPA as being an acceptable risk range. The EPA and ADEQ should be made aware of this and should concur that the  $2.2 \times 10^{-4}$  is an acceptable risk for this CAOC.

**U&A Response**

Based on the additional data obtained at CAOC 10 in February 1997, the excess cancer risk has been revised from  $2.2 \times 10^{-4}$  to  $1 \times 10^{-4}$ . This value is sufficiently close to  $1 \times 10^{-4}$  for the risk management decision proposed in this ROD. EPA and ADEQ are aware of the calculated risk values.

**MCAS Yuma Comment**

6. Paragraph 2.11, page 2-25, states "No state or federally listed or threatened endangered species are currently known to be present at MCAS Yuma. No critical habitats or habitats of endangered species are affected by the COPECs at OU2". However, Paragraph 2.13.3, page 2-34 states "Federal threatened and endangered species have been observed on and in the immediate vicinity of MCAS Yuma". These paragraphs conflict with each other.

**U&A Response**

The only federal threatened and endangered species that have been observed at MCAS Yuma are migratory birds that have been observed in the air space above the base. These species have not been observed in any of the CAOCs in OU2. The text on page 2-25 has been revised as follows:

With the exception of migratory birds that have been observed in the airspace above MCAS Yuma, no state or federally listed threatened or endangered species are currently known to be present at MCAS Yuma. No critical habitats or habitats of endangered species are affected by COPECs at OU2.

The text on page 2-34: has been similarly revised.

**MCAS Yuma Comment**

7. Paragraph 2.13.4, page 2-38, states that Alternative 2, Institutional controls is the preferred alternative for CAOCs 1 and 8A. This paragraph should state that Alternative 2 is also the preferred alternative for CAOC 10.

**U&A Response**

The text has been revised as requested.

**MCAS Yuma Comment**

8. Paragraph 2.14.1, page 2-41, "during excavation, soil should be watered to minimize dust: should be specified.

**U&A Response**

The text has been revised as requested.

**MCAS Yuma Comment**

9. Paragraph 2.15, seems to repeat topics that were discussed in previous paragraphs. Is this paragraph necessary?

**U&A Response**

Although Section 2.15 contains some duplication of previous material, it serves a unique purpose in the required contents of the ROD, as specified in the EPA guidance document for the preparation of a ROD (OSWER Directive 9335.3-02).



**MCAS Yuma Comment**

10. Figure 2-8, CAOC 9: Location of ACM Debris, the location of the ACM pile on the figure is incorrect. The ACM pile is west of the location specified on the map.

**U&A Response**

Figure 2-8 has been revised as requested.

## **Attachment**

### **Excerpts from Marine Corps Air Station Yuma Base Master Plan**

#### **1.0 EXECUTIVE SUMMARY**

##### **PURPOSE OF THE PLAN**

Activity Master Planning of Naval and Marine Corps installations is directed by NAVFAC INST 11010.63B dated October 22, 1982. The primary planning instructions for Marine Corps facilities are contained in M.O. P11000-12C. The purpose is to provide a comprehensive and practical planning process that will support current and projected mission requirements; improve operational capabilities; and protect infrastructure investments, resources, and the environment. The Masterplan Update of the Marine Corps Air Station Yuma, Arizona provides the Navy and Marine Corps with realistic and orderly development guidance for the maintenance and further improvement of the installation. It is a decision-making tool for all levels of command that addresses current issues and provides a preferred and recommended development program and plan.

The Plan will serve as a base document that will continue to be updated formally within the six-year cycle mandated by Naval Facilities Engineering Command (NAVFACENGCOM) in conjunction with the Headquarters Marine Corps (HMC). It will be revised informally, as required, by those responsible for its implementation. The plan has been prepared not only as a facility scoping and siting guide, but as an information source and catalyst for base development beyond its time frame and as future conditions may require.

##### **FEATURES OF THE MASTERPLAN**

MCAS Yuma has expanded significantly in the past decade, both in terms of increases of base loading and operations and the importance of its missions. The Station is now one of the most heavily utilized stateside air facilities in the U.S. Navy system and is a crucial element for both air combat training and operational readiness for the U.S. Marine Corps. This development has resulted in severe problems for land and facility use planning, however, because the Station is small in area and is bounded by civilian aviation uses and an aggressive program of development by the community that have made expansion difficult and expensive.

A result of the changes, both of missions and aircraft that have occurred at MCAS Yuma, has been a lack of development of a comprehensive land use plan. This Masterplan offers such a land and facility use plan for the first time. The attention of the plan is directed toward the siting of facilities and activities within the requirements of the Station's Air Installation Compatible Use Zone (AICUZ) program and the promotion of greater coordination among the functions of the Station. The plan is based on a concept of an ideal station configuration.

A principal feature of the plan has been the proposal to move ordnance storage activities from the Main Station to an accessible location near the desert training facilities. This will enable the Station to meet the requirements of an assignment as a secondary ordnance stocking point for the Navy and the combat readiness and training missions. Additionally, this will increase safety on the base, especially in family housing areas, and free a significant amount of land for housing and billeting, personnel support, training, and operational uses.

##### **ACTIVITY DESCRIPTION**

MCAS Yuma is located in the southwestern corner of the State of Arizona near both the California

border and the international border with Mexico. The Main Station is located on land within the City of Yuma at the southeastern limits of the city. The airfield utilized by MCAS Yuma for military operations is a joint-use facility that includes commercial, general aviation, and aircraft manufacturer facilities and operations under agreement with the Yuma County Airport Authority.

In addition to the Main Station, MCAS Yuma maintains or schedules the use of other nearby facilities. These include the P-111 Desert Training Facility, utilized for Anti-Aircraft Missile training; Auxiliary Airfield-2 that includes a practice landing (LHA) pad; other Auxiliary Airfields; and bombing ranges and targets in coordination with other military commands. There is a small off-base family housing unit within the City of Yuma and recreation facilities at nearby Martinez Lake that are also owned by the Station.

## **MISSION**

The primary mission of MCAS Yuma is to maintain and operate facilities and provide services and materials to support operations of a Marine Aircraft Wing, or units thereof, and other activities and units as designated by the Commandant of the Marine Corps in coordination with the Chief of Naval Operations. Important tasks assigned to MCAS Yuma include aircraft maintenance, operational training support, and administrative and logistic services. The Station provides ordnance storage, arming, and disposal for tenant and training activities and serves as a secondary ordnance stocking point for the Navy.

Major Tenant groups, squadrons, and units include:

- Marine Aircraft Group-13 (MAG-13)
- Marine Aviation Weapons and Tactics Squadron One (MAWTS-1)
- Marine Wing Weapons Unit One (MWWU- 1)
- Marine Wing Weapons Unit Three (MWWU-3)
- Marine Wing Support Squadron 371 (MWSS-371)
- Second Light Anti Aircraft Missile Battalion (2nd LAAM Bn)
- Marine Air Control Squadron Seven (MACS-7)

## **MAJOR FINDINGS AND RECOMMENDATIONS**

A series of findings have been generated by the Masterplan process at MCAS Yuma. These are the basis for the plans and recommendations included in the Masterplan Update. Significant findings and recommendations are summarized below:

Finding: The primary task and responsibility of MCAS Yuma during the period covered by the Masterplan will be the stand-up of a new tenant group, MAC-13. This tactical air group is replacing a Combat Crew Readiness Training Group (MCCRTG-10) that has been the major tenant of the Station. This will involve new aircraft (AV-88), increases and changes of base loading, and requirements for new facilities.

Recommendation: Developments of MCAS Yuma during the planning period will focus on the installation of MAG-13. This will require concentration in planning of facilities at the main station and the P-111, Desert Training Site. New and improved facilities are required for MAG-13 and other homeported, tenant, and rotational operations at the main station. The P-111 Site will be utilized for 2nd LAAM Bn and MACS-7. MAG-13 will utilize the facilities these units have been using at the Station.

Finding: There is an acute shortage of developable land on the main station that presents

severe limitations to development. This has resulted in the past siting of housing, personnel support, and training activities within Noise Zone 3 in potential violation of the Station's AICUZ; siting of housing and personnel support adjacent to ordnance ESQD areas; and the siting of family housing units off station.

Recommendation: A land use plan is recommended in the Masterplan for the siting of facilities and activities that will minimize future land use conflicts.

Recommendation: Land to be purchased from the U.S. Bureau of Reclamation (BUREC) during the Masterplan period will be utilized for bachelor housing and personnel support activities only. Although much of the land to be acquired is within Noise Zone 3, it is at the outer edge of the zone and is ideally situated for personnel billeting because of access to the flight line. Noise attenuation will be required for all construction.

Recommendation: Ordnance storage will be moved from the main station and sited in the vicinity of P-111. This will remove ESQD arcs that are restricting the development of significant land parcels on station. The relocation of ordnance storage will begin with MILCON Project, P-346, during the Masterplan period.

Recommendation: An Ultimate Land Use Plan is recommended to be developed beyond the planning period. This should include siting of all housing and personnel support activities on the main station outside of Noise Zone 3 and well away from ESQD or Hazardous Electromagnetic Radiation Arcs. The Ultimate Land Use Plan should also include the development of an Outlying Landing Field (OLF) to relieve congestion of the Station and provide additional training capabilities.

Finding: The present location of ordnance storage requires a permanent waiver at the south border of the Station, where ESQD arcs cross a public road, and special waivers during peak activity times such as Weapons Training Instruction. These waivers may not be continued, which would limit ordnance storage capacity and training activities.

Recommendations: The relocation of ordnance storage to the vicinity of P-111, beginning with MILCON P-346, will eliminate the need for the permanent waiver. It will also allow eventual expansion of the Combat Aircraft Loading Apron (CALA) and relocation of the bomb build-up areas that will eliminate the need for the special waivers.

Finding: The changes of mission and increases of base loading have resulted in traffic circulation and parking shortages and problems, particularly during peak work hours.

Recommendation: A comprehensive traffic circulation study should be requested of the Military Traffic Management Command, Transportation Engineering Agency. The study will provide a basis for traffic planning for the Station for future development.

Recommendation: The circulation network should incorporate the BUREC property to be acquired during the planning into the Station street system.

Recommendation: A designated parking area system, with decal designations, is recommended for key areas of the Station. Peak-hour shuttle bus service, from the parking areas and off-base housing, is recommended.

Recommendation: The principal road at the flight line will be designated as a one-way street to relieve congestion and potential traffic hazards during peak hours.

Recommendation: Sidewalks for pedestrian use should be included in new street

improvements.

Recommendation: Staggered work hours should be adopted to relieve congestion at peak times.

Recommendation: Supply functions should be consolidated in one area at the northeast area of the flight line to improve supply and circulation.

Finding: Public roads adjacent to the Station and public roads utilized for Station activities require improvements to ensure the safety of military and civilian personnel.

Recommendation: County Road 14 will become a route for regular transport of ordnance with the relocation of ordnance storage. The road should be designated a U.S. Defense Highway. This will provide federal funds for the county and state for needed improvements to this road.

Recommendation: Coordination should be initiated with the county of Yuma's Transportation Department and the Arizona Department of Transportation for improvements to off station roadways utilized by base personnel. These should include:

- a designated bicycle path along Avenue 3E
- a pedestrian overhead walkway across Avenue 3E to a planned new shopping mall; the traffic lights currently in place have not provided safe pedestrian crossing areas
- noise attenuation structures and sound absorbing materials to be installed along Avenue 3E in the vicinity of housing and personnel support areas.

Finding: With the changes of aircraft resulting from new tenant and transient training operations, the Station's AICUZ must be updated.

Recommendation: The AICUZ Update should be undertaken in 1992/93, one year after the fourth AV-8B squadron has received its full complement of aircraft.

Finding: The main station currently contains a mixture of building types and buildings of different ages that lack visual appeal or esthetic qualities and that thus affect morale and pride in the base.

Recommendation: Future developments and improvements should be made following the Basic Exterior Architectural guidelines provided in the Masterplan Update.

## **2.0 INTRODUCTION**

### **PURPOSE OF THE PLAN**

Guidance for Masterplanning of Naval and Marine Corps installations is contained in NAVFAC INST 11010.63B, dated October 20, 1982. The purpose is to provide a comprehensive and practical planning process that will support current and projected mission requirements; improve operational capabilities; and protect infrastructure investments, resources and the environment. The Plan demonstrates the commitment of the Navy and the Marine Corps to the implementation of Department of Defense (DOD) and other federal policies.

The activity master planning process has been designed to ensure the logical, orderly and efficient use of land and facility resources, and of military construction program funding. The

process includes mechanisms to meet operation, safety and environmental requirements in the siting and designing of activity projects.

This Masterplan of the Marine Corps Air Station, Yuma, Arizona provides the Navy and Marine Corps with realistic and orderly development guidance for the maintenance and further improvement of the installation. It is a decision-making tool for all levels of command that addresses current issues and provides the necessary background for planning and review. A preferred development program and plan is recommended that has been selected by the Navy and Marine Corps as the most viable alternative, taking into consideration the Station's current situation and the planned future of both the Station and its environment. This Plan has been based upon information provided by the Station, and these recommendations reflect the evaluation, judgments and decisions of base personnel.

The Plan will serve as a base document that will continue to be updated formally within the six-year cycle mandated by NAVFAC and solicited by HMC. It will be revised informally, as required, by those involved with its implementation. The Plan has been prepared not only as a facility scoping and siting guide, but as an information source and catalyst for base development beyond its time frame and as future conditions may require.

#### **PLANNING ASSUMPTIONS**

During the preparation of the Masterplan, several assumptions concerning the planning period were made that directly guided its development. These are described in the body of this report and include:

- MCAS Yuma will continue to exist at its present location and will continue to be a vital element in Pacific Fleet air training and operations.
- Aircraft operations at the Air Station will remain at least at the 200,000 per year level and may be increased with planned new tenants and aircraft.
- The Station personnel and aircraft loading will continue to increase to meet Navy and Marine Corps operations requirements (projected increase in loading are provided in the Masterplan report).
- MCAS Yuma will continue to host both tenant and transient activities, and will be required to provide both base and community support facilities for these activities.
- Yuma International Airport will continue to contribute a significant portion of total airfield operations.
- Pressures for development of the City and County of Yuma, in the vicinity of the Station, will continue that could jeopardize air operations and the public safety by incompatible development in inappropriate locations.
- Land use controls within determined noise and safety zones around the airfield will continue to be valid in base and community planning for the health, safety and welfare of the citizenry.
- The effort to ensure the compatibility of development within and around the Station will continue.

The Masterplan is an update of the 1981 Masterplan to bring it into conformance with new DOD and

NAVFAC guidelines, existing conditions, and new and projected base loadings. Several major new conditions have come into existence since the 1981 Plan, including:

- Changes in missions, aircraft, and operations at the Station.
- Increased development and changes in land uses in the vicinity of the Station.
- Increases in civilian and private air traffic at the airport, and in the airspace utilized by the Station.
- Property values in the area have continued to rise.

#### **MASTER PLANNING PROCESS**

Master planning for Naval and Marine Corps facilities has been designed as a dynamic approach to analysis and program design. The process is based upon the operational requirements of the installation, Navy and Marine Corps policies and instructions, and is sensitive to man-made and natural constraints, fiscal resources and human concerns.

The process was designed in incremental steps that allowed for review at each stage of development of the Plan. The principal steps were the establishment of goals and objectives; data collection and analysis; the development of planning concept alternatives; development of recommendations (giving priority to the Military Construction Program, environmental and community concerns, and fiscal constraints); Command and public review of proposals; and synthesis of programs, concerns and constraints into the final Plan.

Figure 2-1 provides a flow diagram of planning steps and accomplishments.

#### **PLANNING GOALS**

The primary focus of the Masterplan is to provide a planning document that will accurately reflect and provide for current and projected mission requirements. It is based on a comprehensive review of current and proposed development, and mission changes that require revision of the existing Masterplan. The recommendations of the Plan provide a basis for the continuing efficient and orderly development of the Station.

Major planning goals include:

- Support of the Station's mission through provision of the facilities needed for future expansion requirements. Priority is given to functions most directly related to the Station's primary mission.
- Document existing conditions data base as a foundation for planning.
- Identify and correct deficiencies in existing facilities, focusing on recommendations that will solve station-wide problems.
- Provide guidance for future facility improvements that can be adopted to changing conditions.
- Provide a clear documentation of the planning process that will facilitate future evaluation and adjustment to changing conditions.
- Increase the quality of life for military and civilian personnel of the Station by improvements in work and living conditions.
- Propose the siting of new facilities to take advantage of existing infrastructure and

circulation systems, and to avoid duplication of facilities and conflicts of use.

- Incorporate findings from other studies, as applicable.
- Develop a Capital Improvements Plan (CIP) program with appropriate phasing recommendations to satisfy deficiencies and future requirements identified in the Masterplan.

<IMG SRC 98028E>

- Develop the Station in a way that is compatible with the surrounding community and that recognizes all natural and man-made constraints.
- Provide a logical and functional land and facility use plan that maximizes the use of land resources, improves installation efficiency, promotes land use compatibility both within and in the vicinity of the Station, and permits future expansion if required.
- Comply with all applicable federal and, to the extent possible, state and local plans and directives that promote public safety, conservation of energy, and environmental resource protection.

#### **DATA COLLECTION**

Two primary data collection strategies were employed: on-site inspection plus interviews to provide surveys of existing land use and facilities; and administration of a comprehensive questionnaire to representatives of Station departments and tenants. The questionnaire solicited information on missions and tasks, building and space utilization, facility requirements, numbers of authorized on-board and projected personnel, relationships with on-station and off-station organizations and personnel, condition and adequacy of location of structures and facilities, traffic circulation and access, utility requirements, problems and solutions, adverse environmental conditions, and planned or proposed future projects and activities.

Data from the questionnaires were classified and expanded by follow-up interviews with department representatives.

Additional data were obtained concerning local and regional civilian and other military installation planning. This included a comprehensive historical and socioeconomic Community profile for the City and County of Yuma. An environmental data base was prepared, including climate, air quality, geomorphology, seismicity, soils, vegetation, and wildlife. A cultural resource assessment included archaeological and historic assessments.

Data collection provided a base for concept development and evaluation at an early stage of the process, but continued throughout as additional information was required and new concepts explored.

#### **ANALYSIS, PLAN DEVELOPMENT AND EVALUATION**

The analysis of data and the development of conceptual plans were accomplished with the guidance of NAVFAC INST 11010.63B. This included the review of existing and required facilities according to the procedures of Basic Facility Requirements and other planning documents. Facility deficiencies, surpluses, and other planning requirements were identified, based on NAVFAC P-80 planning criteria.



With these identifications of facility requirements, solutions and developmental strategies were devised. Land use plans and recommendations for development were prepared to remedy deficiencies and meet future requirements. These recommendations are based on the priority of mission requirements and fiscal resources. The resulting Masterplan of land use and facility development provides a phased program of facility siting to accommodate future growth.

#### **COMMAND REVIEW**

A review of development concepts was conducted by the Commanding Officer, MCAS Yuma, and his staff. A pre-draft Plan was then reviewed by Western Division Naval Facilities Engineering Command (WESTNAVFACENGCOM) and by MCAS Yuma. The draft Plan was reviewed by MCAS Yuma Commander, Marine Corps Air Bases Western Area (COMCABWEST), Commandant Marine Corps (CMC), and WESTNAVFACENGCOM.

#### **PUBLIC REVIEW**

A draft of the final Masterplan was presented to the City of Yuma, Yuma County, and the State of Arizona for intergovernmental coordination in compliance with DOD directions and Executive Order 12372.

#### **FINAL PLAN**

When approved by WESTNAVFACENGCOM, COMCABWEST, HMC, and CMC, this Final Plan will become the official plan and future development guide for the Marine Corps Air Station, Yuma, Arizona.

#### **ORGANIZATION OF THE REPORT**

The report of the Masterplan has been prepared in 12 chapters with appendices to provide supporting documentation. In addition to the Executive Summary and this Introduction, these chapters and appendices are:

- Chapter 3 - Regional Setting
- Chapter 4 - Activity Description
- Chapter 5 - Installation Description and Analysis
- Chapter 6 - Development Impacts
- Chapter 7 - Concept Development
- Chapter 8 - Proposed Land and Facility Use Plans
- Chapter 9 - Base Exterior Architecture Plan
- Chapter 10 - Capital Improvements Plan
- Chapter 11 - Air Installation Compatible Use Zone (AICUZ) Program
- Chapter 12 - Preliminary Environmental Assessment
- Appendix A - Facility Requirements Program (FRP)
- Appendix B - Facility Index (Building and Structural Use Summary)
- Appendix C - MILCON Program - MCAS Yuma
- Appendix D - Acronyms
- Appendix E - Hazardous Waste Storage and Dump Sites
- Appendix F - Electromagnetic Hazards Survey for Transmitters of MCAS Yuma
- Appendix G - Airfield Safety Waivers
- Appendix H - References

B: Community Relations

## **Appendix B**

### **Community Relations Activities Conducted by Navy**

A public hearing on the Proposed Plan for Operable Unit 2 (OU2) was held on April 9, 1997 at the Yuma County Main Library. The hearing began at 6:00 p.m. and concluded at 7:20 p.m. The Navy and regulatory agencies were represented by:

- Gary Kiger, Clean Project Manager, Jacobs Engineering, 251 S. Lake Avenue, Pasadena, CA 91101
- Larry Leake, IR Program Manager, MCAS Yuma, Building 228, Yuma, Arizona.
- Bob Carpenter, Environmental Director, MCAS, Yuma.
- Nadine Spertus, Remedial Project Manager, Southwest Division, Naval Facilities Engineering Command, 1220 Pacific Highway, San Diego, CA 92132-5181.
- Amanda Stone, Remedial Project Manager, Arizona Department of Environmental Quality, 3033 North Central Avenue, Phoenix, AZ 85012.
- Rachel Simons, Remedial Project Manager, U.S. Environmental Protection Agency, Region IX, 75 Hawthorne Street, San Francisco, CA, 94104-3901.

Mr. Carpenter explained the purpose of the public meeting and summarized the work to date at OU2. Nadine Spertus explained the CERCLA process, the Department of Defense Installation Restoration Program, and the contents of the Proposed Plan. Ms. Spertus explained the planned removal of asbestos-containing material from three of the CAOCs, as well as the other alternatives that were considered. Ms. Spertus also described the three CAOCs at which land use restrictions will be used to manage risk levels.

Amanda Stone explained that the State agreed in principal with the land use restrictions for the three CAOCs. Ms. Stone explained that the State and the Navy were still working out the legal details of implementing the land use restrictions, but that the details would be worked out before the Record of Decision was signed.

Ms. Spertus closed the presentation part of the Public Meeting by inviting the public to make verbal or written comments on the Proposed Plan. Because the Proposed Plan had been distributed later than anticipated, Ms. Spertus announced that the end of the period for submitting written comments on the Proposed Plan would be extended from April 21 to April 28, 1997.

Following the presentation, several members of the public asked for further explanations of the Proposed Plan.

Mr. John Colvin asked Amanda Stone to explain the proposed land use restrictions in greater detail. After Ms. Stone provided further information on the legal issues, Mr. Colvin asked if such a land use restriction would also be applicable to the proposed asbestos removal. Mr. Colvin asked if the use of a land use restriction for asbestos debris sites would save the estimated \$710,000 cost of excavating asbestos, as long as the \$90,000 surface cleanup was performed. Mr. Colvin suggested that if the buried asbestos were left in place, the cost of removal could be borne by any future private developer of the sites, rather than by public money. Ms. Stone explained that the decision to excavate the buried asbestos was a group decision made by many members of the project team. A land use restriction at the asbestos sites would be much more restrictive than the land use restrictions that maintain the current uses of

CAOCs 1, 8A, and 10. Some of the asbestos sites are currently slated for development by the Navy and any excavation at these sites would require removal of the buried asbestos. In addition, as long as the asbestos remains in the ground, there is a potential for accidental breakdown of the asbestos materials and the resulting release of fibers.

Ms. Marla Lewis commented that removing the asbestos now would probably be cheaper than waiting till some unspecified date in the future. Ms. Stone observed that the cleanup cost for these sites was not bad compared to many other sites.

Mr. Kevin Shaffer asked why the cleanup was not being paid for by Superfund. Ms. Spertus explained that the Marine Corps and Navy have a separate fund of money called the Environmental Restoration Navy Account. Superfund was specifically set up for private parties and is intended to be a revolving fund that is repaid by identified responsible parties.

Ms. Dottie Lofstrom asked if monitoring wells had been used to study the landfill (CAOC 8A). Ms. Simons explained that, although soil samples were not taken from within the landfill, soil samples were collected from the surface of the landfill, soil vapor samples were collected from within the landfill, and groundwater samples were collected from around the perimeter of the landfill.

One written comment was received during the comment period. This comment is included as an attachment to this appendix. The comment consisted of a favorable evaluation of the Proposed Plan and a question on the feasibility of using alternative forms of energy in the pollution management process. The comment did not result in any changes to the Proposed Plan.

## Tables

**Table 2-1: Chemicals of Potential Concern (COPC) for OU2**

Petroleum Products	Semivolatile Organics	Herbicides
TPH-Diesel	(Cont'd.)	2,4-D
TPH-Gasoline	Benzo(b)fluoranthene	Dalapon
	Benzo(k)fluoranthene	2,4-DB
Volatile Orizanics	Benzo(a)pyrene	Dicamba
Benzene	Indeno(1,2,3-cd)pyrene	Dichlorprop
Toluene	Dibenz(a,h)anthracene	Dinoseb
Ethylbenzene	Benzo(g,h,i)perylene	MCPA
Xylene(Total)	2-Nitroaniline	MCPP
2-Butanone	Hydroquinone	2,4,5-T
4-Methyl-2-pentanone	Xylol bromide**	2,4,5-TP
Carbon tetrachloride	Ethyl iodoacetate**	
Methylene chloride	Chloroacetophenone**	Miscellaneous
Organics		
Trichloroethene(TCE)	Bromobenzyl cyanide**	Ethylene glycol
1,1,2,2-Tetrachloroethane		Lead(Organic)
1,1,1-Trichloroethane	Pesticides and PCBs	
Tetrachloroethene(PCE)	alpha-Chlordane	Inorganics
Chlorotrifluoromethane**	gamma-Chlordane	Aluminum
1,1,2-Trichloro-1,2,2-trifluoroethane	Aroclor-1016	Arsenic
Methyl tert-butyl ether	Aroclor-1221	Barium
	Aroclor-1232	Cadmium
	Aroclor-1242	Chromium(total)
	Aroclor-1248	
Semivolatile Organics		
Chromium(hexavalent)		
Naphthalene	Aroclor-1254	Lead
2-Methylnaphthalene	Aroclor-1260	Radium+
Acenaphthene		Silver
Acenaphthylene		Vanadium
Fluorene	Organophosphorus	Zinc
Phenanthrene	Pesticides	Cyanide
Anthracene	Chlorpyrifos	Asbestos
Fluoranthene	Diazinon	
Pyrene	Dichlorvos	
Benzo(a)anthracene	Dimethoate	
Chrysene	Malathion	

\*\* These analytes were only sought as tentatively identified compounds.

+ Radium was included only in the on-site analytical program for CAOC 11.

**Table 2-2: Maximum Concentrations of Volatile Organic Compounds  
Detected by Off-Site Laboratory at 0 to 10 Feet, MCAS YUMA, Operable Unit 2  
Concentrations in milligrams per kilogram**

Analyte	Residential Risk-Based Criteria		Industrial Risk-Based Criteria		CAOC			
	Cancer	Noncancer	Cancer	Noncancer	1	2	3	4
1,1-Dichloroethene	--	2.22	--	14.5	*	*	*	*
2-Butanone	--	2,770	--	3,070	2.31	*	*	*
Carbon Disulfide	--	3.89	--	25.4	*	*		*
Chloromethane	3.17	--	5.82	--	0.11	*	*	*
Freon 113	--	1,130	--	1,130	*	*	*	*
Methylene Chloride	6.44	1,930	12	1,930	0.16	0.077	*	*
Tetrachloroethene	3.51	338	8.84	338	*	*	*	*
Toluene	--	484	--	48.4	*	*	*	*
Trichlorofluoromethane	--	142	--	933	*	*	0.3	*
Xylene	--	1,930	--	1,930	0.09	*	*	*

Notes:

- indicates that this constituent does not have cancer and/or noncancer toxicity.
- \* indicates that this constituent was not a constituent of potential concern (COPC) for this CAOC.

Table 2-2: Maximum Concentrations of Volatile Organic Compounds  
Detected by Off-Site Laboratory at 0 to 10 Feet, MCAS YUMA, Operable Unit 2  
Concentrations in milligrams per kilogram

[illegible]

Table 2-3: Maximum Concentrations of Semi-Volatile Organic Compounds and Total Petroleum Hydrocarbons Detected, by Off-Site Laboratory, Operable Unit 2, Concentrations in milligrams per kilogram

Analyte	Residential Risk-Based Criteria		Industrial Risk-Based Criteria		CAOC	
	Cancer	Noncancer	Cancer	Noncancer	1	2
Semi-Volatile organic compounds						
1,2,3,5-Tetrachlorobenzene	--	11.7	--	96.3	*	*
1-Methyl-2-Pyrrolidinone	NA	NA	NA	NA	0.16	*
2-Cyclohexen-1-ol	NA	NA	NA	NA	0.1	0.11
2-Cyclohexen-1-One	NA	NA	NA	NA	0.095	*
2-Methylnaphthalene	--	608	--	608	54	*
Pentene, 2-Methoxy	NA	NA	NA	NA	*	*
2-Pyrrolidinone, 1-Methyl	NA	NA	NA	NA	*	*
2,4-Dinitrotoluene	--	78	--	640	*	*
2-Pentanone, 4-Hydroxy-4-Methyl	NA	NA	NA	NA	9.8	*
4-Methylphenol	--	195	--	1,600	*	*
7H-Benz(DE)Anthracen-7-One	NA	NA	NA	NA	1.7	*
9,10-Anthracenedione	NA	NA	NA	NA	1.6	*
Acenaphthene	--	55.6	--	55.6	0.034	*
Acenaphthylene	NA	NA	NA	NA	0.045	*
Anthracene	--	1.76	--	1.76	0.26	*
Benzene, 1,4-Dimethoxy-2,3	NA	NA	NA	NA	*	*
Benzo(e) Pyrene	NA	NA	NA	NA	0.17	*
Benzo(a) Anthracene	0.391	--	1.23	--	3.6	0.12
Benzo(a) Pyrene	0.0391	--	0.123	--	4.5	0.065
Benzo(b) Fluoranthene	0.391	--	1.23	--	10	0.11
Benzo(g,h,i) Perylene	NA	NA	NA	NA	2	*
Benzo(k) Fluoranthene	3.91	--	12.3	--	4.2	0.096
Benzo(b) Naphtho(2,3-D)Furan	NA	NA	NA	NA	0.18	*
Bis(2-Ethylhexyl) Phthalate	20.4	780	64.1	6,400	2.7	1.4
Butyl Benzyl Phthalate	--	7,800	--	64,000	0.25	0.041
Carbazole	14.3	--	44.9	--	0.77	*
Chrysene	39.1	--	123	--	5.6	0.15
Cyclopenta(def) Phenanthrenon	NA	NA	NA	NA	0.62	*
Di-n-Octylphthalate	--	780	--	6,400	0.24	*
Di-n-Butylphthalate	--	3,900	--	32,000	1.78	1.61

Dibenzo(a,h) Anthracene	0.0391	--	0.123	--	0.97	*
Dibenzofuran	NA	NA	NA	NA	0.05	*
Diethyl Phthalate	--	31,200	--	100,000	*	*
Ethanol, 2-[2-[4-(1,1,3,3-T	NA	NA	NA	NA	*	*
Ethanone, 1-Oxiranyl	NA	NA	NA	NA	0.071	*
Ethylene Glycol	--	78,000	--	100,000	170	*
Fluoranthene	--	1,560	--	12,800	8.3	0.21
Fluorene	--	47.6	--	47.6	0.044	*
Hexanedioic Acid, Bis(2-Ethyl)	NA	NA	NA	NA	5.1	0.8
Indeno (1,2,3-cd) Pyrene	0.391	--	1.23	--	2.5	*
N-Nitrosodiphenylamine	58.2	--	183	--	*	*
Naphthalene	--	124	--	124	70	*
Nonylphenol	NA	NA	NA	NA	*	*
Pentachlorobenzene	--	31.2	--	256	*	*
Phenanthrene	--	42	--	42	2.6	0.074
Phenol	--	18,700	--	100,000	0.064	*
Phenol, 2,2 - Methylenebis(6	NA	NA	NA	NA	*	*
Pyrene	--	1,170	--	9,600	8	0.22
Trans-Chlordane	NA	NA	NA	NA	*	*
Total Petroleum Hydrocarbons 1						
Diesel	--	--	--	--	5,100	6,000
Gasoline	--	--	--	--	48	*
Total Petroleum Hydrocarbons	--	--	--	--	4,200	*

Notes:

- indicates that this constituent does not have cancer and/or noncancer toxicity.
- \* indicates that this constituent was not a constituent of potential concern (COPC).
- NA indicates no toxicity data available
- 1 Total Petroleum Hydrocarbons are not included in RBC calculations because constituents of greatest concern (BTEX and PAHs) are addressed individually.



Table 2-3: Maximum Concentrations of Semi-Volatile Organic Compounds and Total Petroleum Hydrocarbons Detected, by Off-Site Laboratory, Operable Unit 2, Concentrations in milligrams per kilogram

Analyte	CAOC											
	3	4	5	6	7	8A	8B	9	10	12	13	14
Semi-Volatile organic compounds												
1,2,3,5-Tetrachlorobenzene	*	*	*	*	0.43	*	*	*	*	*	*	*
1-Methyl-2-Pyrrolidinone	*	*	*	*	*	0.13	*	*	*	*	*	*
2-Cyclohexen-1-ol	*	*	*	*	*	*	*	0.1	*	*	*	*
2-Cyclohexen-1-One	*	*	*	*	*	*	*	*	*	*	*	*
2-Methylnaphthalene	*	*	*	*	0.033	*	*	*	*	*	*	*
Pentene, 2-Methoxy	*	*	0.37	*	*	*	*	*	*	*	*	*
2-Pyrrolidinone, 1-Methyl	*	*	0.15	*	*	*	*	*	*	*	*	*
2,4-Dinitrotoluene	*	0.037	*	*	*	*	*	*	*	*	*	*
2-Pentanone, 4-Hydroxy-4-Methyl	*	*	*	*	*	*	*	11	*	*	*	*
4-Methylphenol	*	*	*	*	0.17	*	*	*	*	*	*	*
7H-Benz(DE)Anthracen-7-One	*	*	*	*	*	*	*	*	*	*	*	*
9,10-Anthracenedione	*	*	*	*	*	*	*	*	*	*	*	*
Acenaphthene	*	*	*	*	*	*	*	*	0.166	*	*	*
Acenaphthylene	*	*	*	*	*	*	*	*	*	*	*	*
Anthracene	*	*	*	*	*	*	*	*	0.388	*	*	*
Benzene, 1,4-Dimethoxy-2,3	*	*	*	0.14	*	*	*	*	*	*	*	*
Benzo(e) Pyrene	*	*	*	*	*	*	*	*	*	*	*	*
Benzo(a) Anthracene	*	0.373	*	*	*	0.2	*	0.081	2.718	*	*	0.13
Benzo(a) Pyrene	*	0.255	*	*	0.12	0.24	*	0.075	2.197	*	0.0391	0.15
Benzo(b) Fluoranthene	*	0.902	*	*	*	0.42	*	0.11	3.482	*	*	0.24
Benzo(g,h,i) Perylene	*	0.038	*	*	0.17	0.035	*	0.04	0.322	*	*	*
Benzo(k) Fluoranthene	*	*	*	*	*	0.2	*	0.064	*	*	*	0.2
Benzo(b) Naphtho(2,3-D)Furan	*	*	*	*	*	*	*	*	*	*	*	*
Bis(2-Ethylhexyl) Phthalate	1.4	*	0.37	3.4	0.12	0.387	*	0.054	*	0.844	20.4	18
Butyl Benzyl Phthalate	0.095	*	0.21	*	0.043	*	*	*	*	0.614	*	0.86
Carbazole	*	*	*	*	*	*	*	*	0.19	*	*	*
Chrysene	0.059	0.363	*	0.055	*	0.27	*	0.11	0.2873	*	*	0.27
Cyclopenta(def) Phenanthrenon	*	*	*	*	*	*	*	*	*	*	*	*
Di-n-Octylphthalate	*	*	*	*	*	*	*	*	*	*	*	*
Di-n-Butylphthalate	0.391	*	3.516	*	0.035	4.038	1.738	*	3.359	2.426	*	*

Dibenzo(a,h) Anthracene	*	0.026	*	*	*	*	*	*	*	*	*	*
Dibenzofuran	*	*	*	*	*	*	*	*	*	*	*	*
Diethyl Phthalate	*	*	*	*	0.054	*	*	*	*	*	*	*
Ethanol, 2-[2-[4-(1,1,3,3-T	*	*	*	*	*	*	*	*	*	*	*	11
Ethanone, 1-Oxiranyl	*	*	*	*	*	*	*	*	*	*	*	*
Ethylene Glycol	*	*	*	*	*	*	*	*	*	*	*	*
Fluoranthene	*	0.194	*	0.036	0.073	0.344	*	0.11	4.132	*	*	0.35
Fluorene	*	*	*	*	*	*	*	*	*	*	*	*
Hexanedioic Acid, Bis(2-Ethyl)	*	0.075	1.4	*	*	*	*	*	*	*	*	*
Indeno (1,2,3-cd) Pyrene	*	1.119	*	*	*	0.074	*	0.044	1.531	*	*	*
N-Nitrosodiphenylamine	*	0.049	*	*	0.065	0.049	*	*	*	*	*	*
Naphthalene	*	*	*	*	*	*	*	*	0.112	*	*	*
Nonylphenol	*	*	*	*	*	*	*	*	*	*	*	6.1
Pentachlorobenzene	*	*	*	*	0.45	*	*	*	*	*	*	6.1
Phenanthrene	*	0.042	*	*	0.057	0.14	*	0.05	1.746	*	*	0.095
Phenol	*	*	*	*	0.044	*	*	*	*	*	*	*
Phenol, 2,2 - Methylenebis(6	*	*	*	*	2.7	*	*	*	*	*	*	*
Pyrene	0.042	0.277		0.036	0.061	0.344	*	0.14	4.057	*	*	0.37
Trans-Chlordane	*	*	0.13	*	*	*	*	*	*	*		
Total Petroleum Hydrocarbons 1												
Diesel	740	270	150	77	1,000	860	22	21	*	*	*	900
Gasoline	*	*	*	*	52	*	*	*	*	*	*	*
Total Petroleum Hydrocarbons	*	*	*	*	*	*	*	*	25	*	*	*

*Table 2-3: Maximum Concentrations of Semi-Volatile Organic Compounds and Total Petroleum Hydrocarbons Detected, by Off-Site Laboratory, Operable Unit 2, Concentrations in milligrams per kilogram*

Analyte	CAOC			
	15	16	17	18
Semi-Volatile organic compounds	*	*	*	*
1,2,3,5-Tetrachlorobenzene	*	*	*	*
1-Methyl-2-Pyrrolidinone	*	*	*	*
2-Cyclohexen-1-ol	*	*	*	*
2-Cyclohexen-1-One	*	*	*	*
2-Methylnaphthalene	*	*	*	*
Pentene, 2-Methoxy	*	*	*	*
2-Pyrrolidinone, 1-Methyl	*	*	*	*
2,4-Dinitrotoluene	*	*	*	*
2-Pentanone, 4-Hydroxy-4-Methyl	*	*	*	*
4-Methylphenol	*	*	*	*
7H-Benz(DE)Anthracen-7-One	*	*	*	*
9,10-Anthracenedione	*	*	*	*
Acenaphthene	*	*	*	*
Acenaphthylene	*	*	*	*
Anthracene	*	*	*	*
Benzene, 1,4-Dimethoxy-2,3	*	*	*	*
Benzo(e) Pyrene	*	*	*	*
Benzo(a) Anthracene	*	*	*	*
Benzo(a) Pyrene	*	*	*	*
Benzo(b) Fluoranthene	*	*	*	*
Benzo(g,h,i) Perylene	*	*	*	*
Benzo(k) Fluoranthene	*	*	*	*
Benzo(b) Naphtho(2,3-D)Furan	*	*	*	*
Bis(2-Ethylhexyl) Phthalate	*	0.055	*	*
Butyl Benzyl Phthalate	*	0.565	*	*
Carbazole	*	*	*	*
Chrysene	*	*	*	*
Cyclopenta(def) Phenanthrenon	*	*	*	*
Di-n-Octylphthalate	*	*	*	*
Di-n-Butylphthalate	*	1.052	*	2.45
Dibenzo(a,h) Anthracene	*	*	*	*
Dibenzofuran	*	*	*	*
Diethyl Phthalate	*	*	*	*
Ethanol, 2-[2-[4-(1,1,3,3-T	*	*	*	*
Ethanone, 1-Oxiranyl	*	*	*	*
Ethylene Glycol	*	*	*	*
Fluoranthene	*	*	*	0.056
Fluorene	*	*	*	*
Hexanedioic Acid, Bis(2-Ethyl)	*	*	*	*
Indeno (1,2,3-cd) Pyrene	*	*	*	*
N-Nitrosodiphenylamine	*	*	*	*
Naphthalene	*	*	*	*
Nonylphenol	*	*	*	*
Pentachlorobenzene	*	*	*	*
Phenanthrene	*	*	*	0.037

Phenol	*	*	*	*
Phenol, 2,2 - Methylenebis(6	*	*	*	*
Pyrene	*	*	*	0.047
Trans-Chlordane	*	*	*	*
Total Petroleum Hydrocarbons 1				
Diesel	*	*	29	*
Gasoline	*	*	*	*
Total Petroleum Hydrocarbons	*	*	*	*

**Table 2-4: Maximum Concentrations of Pesticides and PCBs  
Detected by Off-Site Laboratory at 0 to 10 Feet, MCAS YUMA, Operable Unit 2  
Concentrations in milligrams per kilogram**

Analyte	Residential Risk-Based Criteria		Industrial Risk-Based Criteria		CAOC	
	Cancer	Noncancer	Cancer	Noncancer	1	2
4,4-DDD	0.935	--	2.63	--	0.021	0.0076
4,4-DDE	0.66	--	1.86	--	0.14	0.092
4,4-DDT	0.66	15.6	1.86	113	0.026	0.044
aldrin	0.0132	0.973	0.0371	6.76	0.000088	0.00071
aroclor 1242	0.0473	--	0.176	--	*	*
aroclor 1254	0.0473	--	0.176	--	0.02	*
aroclor 1260	0.0473	--	0.176	--	0.39	*
dieldrin	0.014	1.56	0.0395	11.3	0.014	0.00457
endosulfan I	--	1.56	--	11.3	*	*
endosulfan II	--	1.56	--	11.3	0.015	*
endosulfan sulfate	--	1.56	--	11.3	0.013	0.00287
endrin	--	9.37	--	67.6	0.0067	0.00414
endrin aldehyde	--	9.37	--	67.6	0.0097	0.00598
endrin ketone	--	9.37	--	67.6	0.018	0.0018
heptachlor	0.0499	15.6	0.14	113	*	*
heptachlor epoxide	0.0247	0.406	0.0694	2.93	0.0065	*
alpha-benzene hexachloride	0.0453	--	0.143	--	0.00027	*
alpha-chlordane	0.173	1.87	0.486	13.5	0.17	0.0067
beta-benzene hexachloride	0.158	--	0.499	--	*	*
delta-benzene hexachloride	0.158	--	0.499	--	0.0063	0.00122
gamma-chlordane	0.173	1.87	0.486	13.5	0.14	0.009
gamma-benzene hexachloride(lindane)	0.173	9.37	0.486	67.6	*	*
methoxychlor	--	156	--	1,130	0.063	0.00918
prometon	--	468	--	3,380	*	0.056

Notes:

- indicates that this constituent does not have cancer and/or noncancer toxicity.
- \* indicates that this constituent was not a constituent of potential concern (COPC) for this CAOC.

**Table 2-4: Maximum Concentrations of Pesticides and PCBs  
Detected by Off-Site Laboratory at 0 to 10 Feet,  
MCAS YUMA, Operable Unit 2  
Concentrations in milligrams per kilogram**

[illegible]

**Table 2-4: Maximum Concentrations of Pesticides and PCBs**  
**Detected by Off-Site Laboratory at 0 to 10 Feet, MCAS YUMA, Operable Unit 2**  
**Concentrations in milligrams per kilogram**

Analyte	CAOC					
	13	14	15	16	17	18
4,4-DDD	*	0.0012	*	*	*	*
4,4-DDE	0.0004	0.008	*	*	*	0.002
4,4-DDT	*	0.0047	*	*	*	0.00191
aldrin	*	*	*	*	*	*
aroclor 1242	*	*	*	*	*	*
aroclor 1254	*	*	*	*	*	*
aroclor 1260	*	*	*	*	*	*
dieldrin	*	0.0012	*	*	*	*
endosulfan I	*	*	*	*	*	*
endosulfan II	*	*	*	*	*	0.00061
endosulfan sulfate	*	0.0052	*	*	*	*
endrin	*	*	*	*	*	*
endrin aldehyde	*	*	*	*	*	*
endrin ketone	*	*	*	*	*	*
heptachlor	0.00108	*	*	*	*	*
heptachlor epoxide	*	0.0003	*	*	*	*
alpha-benzene hexachloride	*	0.00072	*	*	*	*
alpha-chlordane	*	0.0014	*	*	*	0.00206
beta-benzene hexachloride	0.00065	*	*	*	*	0.00056
delta-benzene hexachloride	*	0.0039	*	*	*	*
gamma-chlordane	*	0.0012	*	*	*	0.00144
gamma-benzene hexachloride(lindane)	*	*	*	*	*	*
methoxychlor	*	0.01	*	*	*	*
prometon	*	*	*	*	*	*

**Table 2-5: Maximum Values Detected by Off-Site Laboratory and  
Background Threshold Limit Values(TLV) for Metals Detected at 0 to 10 Feet  
Concentrations in milligrams per kilogram**

Analyte	Residential Risk-Based Criteria		Industrial Risk-Based Criteria		CAOC1	
	Cancer	Noncancer	Cancer	Noncancer	TLV	Maximum
Aluminum	--	71,100	--	100,000	20,800	26,200
Antimony	--	28.4	--	532	6.98	*
Arsenic	0.302	21.3	1.9	399	8.59	16
Barium	--	1,520	--	12,400	187	437
Beryllium	0.129	356	0.859	6,650	1.97	0.43
Cadmium	26.5	35.6	45.4	665	1.04	6.2
Chromium	--	71,100	--	100,000	49.2	32.2
Chromium VI	4.07	356	6.97	6,650	nd	*
Cobalt	--	4,540	--	29,600	12.2	16.6
Copper	--	2,630	--	49,200	15.4	47.1
Lead 1	--	--	--	--	15.8	102
Manganese	--	136	--	1,180	319	727
Mercury	--	21	--	382	nd	1.3
Nickel	--	1,420	--	26,600	19.5	39.3
Selenium	--	356	--	6,650	2.26	0.59
Silver	--	356	--	6,650	1.15	42.1
Thallium	--	4.98	--	93.1	4.21	0.5
Vanadium	--	498	--	9,310	37.7	56.7
Zinc	--	21,300	--	100,000	37.9	101
Cyanide	--	1,420	--	26,600	nd	*

Notes:

- indicates that this constituent does not have cancer and/or noncancer toxicity.
- \* indicates that this constituent was not a constituent of potential concern(COPC)for this CAOC.
- nd indicates that no data were obtained for TLV calculations.
- 1 EPA Region IX residential and industrial soil screening levels for lead are 400 mg/kg and 1,200 mg/kg, respectively. Concentrations below these values are not considered to have a negative health effect.



**Table 2-5: Maximum Values Detected by Off-Site Laboratory and  
Background Threshold Limit Values(TLV) for Metals Detected at 0 to 10 Feet  
Concentrations in milligrams per kilogram**

Analyte	CAOC 2		CAOC 3		CAOC 4		CAOC 5	
	TLV	Maximum	TLV	Maximum	TLV	Maximum	TLV	Maximum
Aluminum	12,000	5,450	9,980	5,160	18,600	12,800	26,400	6,120
Antimony	6.72	10.2	6	*	6	*	7.78	*
Arsenic	8.5	3.5	4.24	5.1	16.8	6.3	21.3	3
Barium	143	124	223	129	226	171	675	92
Beryllium	0.39	*	0.33	*	0.89	*	0.85	*
Cadmium	0.59	3.4	0.48	2.4	0.89	3	6.38	*
Chromium	38.2	24.6	45.4	21.4	61.2	24.4	30.0	17.2
Chromium VI	nd	*	nd	0.36	nd	*	nd	*
Cobalt	8.13	3.5	6.41	3.9	6.94	6.5	9.02	3.3
Copper	10.5	22.8	4.8	42.6	8.25	33.8	21.4	15.5
Lead 1	9.6	232	7.91	103	11.5	88.5	19.8	43.5
Manganese	193	145	193	201	521	574	1,050	170
Mercury	nd	0.12	*	*	*	0.35	nd	*
Nickel	17.9	9.5	6.65	24.9	9.25	15.9	20.1	7.6
Selenium	3.07	*	2.27	0.65	5.94	0.69	4.87	0.61
Silver	1.2	*	1.15	*	1	4.4	1.34	*
Thallium	6.1	1.2	2.75	*	16.8	*	11.5	*
Vanadium	23.4	22.9	20.2	19.1	43.1	40.3	43.1	33.8
Zinc	23.3	135	14.3	112	35.4	220	49.2	79.2
Cyanide	nd	*	nd	*	nd	*	nd	*

**Table 2-5: Maximum Values Detected by Off-Site Laboratory and  
Background Threshold Limit Values(TLV) for Metals Detected at 0 to 10 Feet  
Concentrations in milligrams per kilogram**

Analyte	CAOC 6		CAOC 7		CAOC 8	8A-Landfill	8B-Housing
	TLV	Maximum	TLV	Maximum	TLV	Maximum	Maximum
Aluminum	20,500	4,690	31,400	18,300	7,770	11,700	5,900
Antimony	6.52	6.5	7.44	7.4	6	8.5	*
Arsenic	6.06	6.3	15.6	10.5	9.68	4.7	3.7
Barium	270	156	334	247	133	160	137
Beryllium	0.7	0.25	4.02	0.54	0.28	0.14	*
Cadmium	1.03	1	1.09	7.1	0.8	1.2	*
Chromium	30.1	12.1	38.8	56.3	10.6	15.7	12.5
Chromium VI	nd	*	nd	*	nd	0.22	*
Cobalt	11.2	3.4	19.7	14.2	6.12	6.5	3.2
Copper	22.5	112	24.8	84.6	21.7	582	50.8
Lead 1	14.3	25.2	21.6	195	8.79	659	22.2
Manganese	397	159	460	678	137	278	150
Mercury	nd	0.06	nd	0.06	nd	0.17	*
Nickel	15.4	9.7	27.4	33.1	6.7	14.9	8
Selenium	3.76	0.61	2.93	1.4	1.89	0.98	*
Silver	1.19	*	1.01	*	1.47	10.2	*
Thallium	3.54	*	3.9	*	6.76	0.5	*
Vanadium	27.5	21	61.6	107	22.6	28	22.1
Zinc	37.5	113	60.8	199	28.0	58.9	52.5
Cyanide	nd	0.31	nd	*	nd	*	*

**Table 2-5: Maximum Values Detected by Off-Site Laboratory and  
Background Threshold Limit Values(TLV) for Metals Detected at 0 to 10 Feet  
Concentrations in milligrams per kilogram**

Analyte	CAOC 9		CAOC 10		CAOC 12		CAOC 13	
	TLV	Maximum	TLV	Maximum	TLV	Maximum	TLV	Maximum
Aluminum	10,200	5,150	6,310	5,290	nd	*	239,000	*
Antimony	7.91	13.4	7.11	*	nd	*	56.5	*
Arsenic	9.06	5	8.99	3.9	nd	*	139	*
Barium	277	103	184	85.3	nd	*	259	*
Beryllium	0.46	0.08	0.28	0.67	nd	*	8.38	*
Cadmium	0.63	6.7	1.64	1.7	nd	*	4.39	*
Chromium	29.9	12.5	25.1	11.2	nd	*	56.9	*
Chromium VI	nd	1.2	nd	*	nd	*	nd	*
Cobalt	9.47	3.9	7.31	3.7	nd	*	48.9	*
Copper	8.37	36.7	5.83	5.5	nd	*	45.9	*
Lead 1	9.88	19.5	6.79	31	nd	*	103	*
Manganese	183	136	157	176	nd	*	2,280	*
Mercury	*	0.12	nd	*	nd	*	nd	*
Nickel	1.88	6.3	9.83	6.8	nd	*	75	*
Selenium	nd	0.61	1.9	0.63	nd	*	48.8	*
Silver	1	3.2	1.14	0.78	nd	*	1	*
Thallium	4.65	1.3	7.88	*	nd	*	1	*
Vanadium	26.8	24.8	26.9	22.3	nd	*	126	*
Zinc	27.7	39.6	30.2	157	nd	*	228	*
Cyanide	nd	0.41	nd	*	nd	*	nd	*

**Table 2-5: Maximum Values Detected by Off-Site Laboratory and  
Background Threshold Limit Values(TLV) for Metals Detected at 0 to 10 Feet  
Concentrations in milligrams per kilogram**

Analyte	CAOC 14		CAOC 15		CAOC 16		CAOC 17	
	TLV	Maximum	TLV	Maximum	TLV	Maximum	TLV	Maximum
Aluminum	59,000	16,900	7,410	*	19,100	4,460	10,800	3,800
Antimony	6	*	6	*	8.26	*	8.36	*
Arsenic	13.1	9.7	7.53	*	10.6	4.2	11.9	4.3
Barium	408	245	148	*	135	170	120	105
Beryllium	2.68	0.86	0.26	*	0.55	*	0.38	*
Cadmium	1.97	3.8	0.72	*	1.72	*	0.68	*
Chromium	40.2	18.9	27.4	*	17.8	6.6	43.4	7
Chromium VI	nd	0.15	nd	*	nd	*	nd	*
Cobalt	44.0	12.5	5.81	*	12.1	2.5	11.7	3.3
Copper	45.1	28.5	4.14	*	13.9	90.4	8.55	26
Lead 1	29.2	25.8	9.71	*	14.1	4.6	9	4.5
Manganese	511	718	166	*	245	138	286	130
Mercury	nd	0.06	nd	*	nd	*	nd	*
Nickel	46.5	29.2	7.24	*	16.0	5.3	18.7	7.2
Selenium	13.1	0.82	6.04	*	3.43	*	3.34	*
Silver	1	*	1	*	1.18	*	1	*
Thallium	3.66	*	6.95	*	7.98	*	7.35	*
Vanadium	79.6	34	20.3	*	30.7	21.9	41.6	20.2
Zinc	78.2	54.8	17.6	*	40.1	148	29.5	57.6
Cyanide	nd	*	nd	*	nd	*	nd	*

**Table 2-5: Maximum Values Detected by Off-Site Laboratory and  
Background Threshold Limit Values (TLV) for Metals Detected at 0 to 10 Feet  
Concentrations in milligrams per kilogram**

Analyte	CAOC 18	
	TLV	Maximum
Aluminum	10,900	6,240
Antimony	8.27	*
Arsenic	11.1	3.1
Barium	127	126
Beryllium	0.42	*
Cadmium	0.73	*
Chromium	19.3	13
Chromium VI	nd	*
Cobalt	9.89	*
Copper	10.1	10.4
Lead 1	9.06	13.5
Manganese	205	148
Mercury	nd	*
Nickel	11.7	6.7
Selenium	3.07	*
Silver	1.48	*
Thallium	7.16	*
Vanadium	35.6	28.8
Zinc	39.9	31.2
Cyanide	nd	*

**Table 2-6: ARARs for Remediation of Asbestos-Contaminated Soil  
MCAS Yuma**

ARAR	Comments
Action-Specific:	
Clean Air Act, National Emission Standards for Hazardous Air Pollutants (NESHAP)	
Clean Air Act (42 USCA Ch 85) 40 CFR Subpart M, Section 61.145, 61.150, and 61.154	NESHAP applies to demolition or renovation of facilities with ACM. Remediation of ACM at MCAS Yuma is neither a renovation nor demolition operation. However, procedures for asbestos emission control (Section 61.145(c)); procedures for ACM waste handling, transportation, and disposal (61.150); and compliance of disposal facilities accepting ACM waste (Section 61.154) are considered relevant and appropriate.

**Table 2-7: ARARs for CAOCs 1 and 10  
MCAS Yuma**

ARAR	Comments
Chemical-Specific:	
Arizona Revised Statutes (ARS), Title 49 The Environment; as implemented in Arizona Administrative Code (AAC) Title 18, Chapter 7, Article 2, Interim Soil Remediation Standards	
Arizona Revised Statutes (ARS) Title 49-151 and 152 Title 18, R18-7-201 through R18-7-209	Requires that soils be remediated to either: 1) background levels; 2) Health Based Guidance Levels; or 3) remediation levels derived from a site-specific risk assessment. This ARAR is relevant and appropriate.

**Table 2-8: Human Health Based Guidance Levels (HBGLs)  
for Ingestion of Contaminants in Soil for COPCs at CAOC 1, 8A, and 10  
Appendix A to Title 18, Chapter 7, Article 2  
June 1995 Update**

Chemical	Cancer Group	Residential Oral HBGL (mg/kg)	Non-Residential Oral HBGL (mg/kg)
Acenaphthene	ND	7000.0	24500.0
Acenaphthylene (PAH)	D	7000.0	24500.0
Anthracene (PAH)	D	35000.0	122500.0
Benz[a]anthracene (PAH)	B2	1.1	4.6
Benzo[a]pyrene (PAH) (BaP)	B2	0.19	0.80
Benzo[b]fluoranthene (PAH)	B2	1.1	4.6
Benzo[k]fluoranthene (PAH)	B2	1.1	4.6
Chrysene (PAH)	B2	110.0	462.0
Dibenz[a,h]anthracene (PAH)	B2	0.11	0.46
Fluoranthene (PAH)	D	4700.0	16450.0
Fluorene (PAH)	D	4700.0	16450.0
Indenopyrene (PAH)	B2	1.1	4.6
Naphthalene (PAH)	D	4700.00	16450.0
Polychlorinated biphenyls (PCBs)	B2	0.18	0.76
Polychlorinated biphenyls	ND	8.2	28.7
Pyrene (PAH)	D	3500.0	12250.0

Cancer Groups:

- B2 Probable human carcinogen
- D Not classifiable as to human carcinogenicity
- ND No data

**Table 2-9: Alternative 3, Soil Volume Estimates**

General Description	Unit North of Building 38 (CAOC 4A)	Subunit Near Active Burn Pit Area (CAOC 7A)
Approximate Area(sf)	12,744	26,400
Depth(ft)	7(average)	1(maximum)
Volume in Place(cy)	3,300	1,000
Excavated Volume(cy)	4,000	1,200
Soil requiring Disposal(cy)	4,000	1,200

Excavated volumes include 20 percent bulking factor  
Totals rounded to nearest 100 cubic yards(cy)

Areas and volumes estimated from data collected in a field survey conducted  
by U&A in February, 1996 (U&A, 1996a).

**Table 2-10: Cost Estimate**  
**Alternative 3: Cleanup of ACM on Soil Surface and**  
**Excavation and Disposal of Soil Mixed with ACM**

Item	Quantity	Unit	Unit Cost	Total
Capital Cost				
Setup				
Mobilization	1	allowance	\$5,000	\$5,000
Fence Removal	1	allowance	\$3,500	\$3,500
Cleanup of ACM on Soil Surface (See Table 2-11)	1	allowance	\$91,000	\$91,000
Excavation of Soil				
Surveying	1	allowance	\$7,000	\$7,000
Excavation	5,180	cy	\$12.00	\$62,160
Dust Control	13	day	\$500	\$6,500
Off Site Disposal				
Waste Characterization	2	allowance	\$1,000	\$2,000
Rollup Bin Rental	100	ea	\$550	\$55,000
Waste Disposal 1	6,750	tons	\$32.25	\$217,700
Transportation	207	load	\$200	\$41,400
Site Restoration				
Site Grading	3	allowance	\$2,540	\$7,620
Sampling				
Air Monitoring	13	day	\$250	\$3,250
Compaction Testing	3	ea	\$400	\$1,200
Construction Cost Subtotal				\$503,300
Construction Management (15%, excluding disposal)				\$42,800
Capital Cost Subtotal				\$546,100
Contingency (30%)				\$163,800
Total Capital Cost (rounded to the nearest \$1,000)				\$710,000
Operation and Maintenance Costs				
None.				
Total Capital and O&M Costs				\$710,000

1 Tons of waste based on 1.20 tons per cubic yard and a wetting factor of 8 percent.



**Table 2-11 Cost Estimate  
Cleanup of ACM on Soil Surface**

Item	Quantity	Unit	Unit Cost	Total
Capital Cost				
Setup				
Mobilization	1	allowance	\$5,000	\$5,000
Removal of ACM				
Removal Activities	12	day	\$3,500	\$42,000
Dust Control	12	day	\$500	\$6,000
Off Site Disposal				
Waste Characterization	2	allowance	\$1,000	\$2,000
Rollup Bin Rental	2	ea	\$550	\$1,100
Waste Disposal	2	load	\$560	\$1,120
Transportation	2	load	\$200	\$400
Sampling				
Air Monitoring	12	day	\$250	\$3,000
Construction Cost Subtotal				\$60,620
Construction Management (15%, excluding disposal)				\$9,100
Capital Cost Subtotal				\$69,720
Contingency (30%)				\$20,900
Total Capital Cost (rounded to the nearest \$1,000)				\$91,000
Operation and Maintenance Costs				
None.				
Total Capital and O&M Costs				\$91,000

Table 2-12: Potential ARARs for Remedial Action for MCAS Yuma

Medium/ Location	Requirements	Prerequisite	Citation	ARAR Determination	Comments
CHEMICAL-SPECIFIC:					
Arizona Revised Statutes (ARS), Title 49 The Environment as implemented in Arizona Administrative Code (AAC) Title 18, Chapter 7, Article 2, Interim Soil Remediation Standards					
Contam- inated soil	Sites that are legally required to conduct soil remediation.	Soils contaminated with constituents identified in Appendix A to the regulation.	ARS 49-151 and 152. R18-7-201 through R18-7-209	Relevant and Appropriate at CAOC 1, 8A, and 10	Requires that soils be remediated to either. 1) background levels; 2) Health Based Guidance Levels; or 3) remediation levels derived from a site-specific risk assessment.
U.S. EPA Guidance on Remedial Actions for Superfund Sites with PCB Contamination USEPA/540/G-90/007					
Soils with PCB Contamina- tion	Approach for evaluating and remediating sites with PCB contamination.	Soils contaminated with PCBs.	USEPA/540/G-90/007	Potential TBC for PCBs at CAOC 8A	Describes recommended approach for evaluating and remediating sites with PCB contamination. Since compliance with ARS 49-151 and 152 is sufficient to protect human health and the environment, this guidance is not considered TBC.
LOCATION-SPECIFIC:					
National Historic Preservation Act, 16 USC Section 470-470w-6 [36 CFR Part 800] and the Archeological Resource Protection Act, 16 USC Section 470ii [36 CFR Part 299]:					
Within area where action may cause irreparable harm, loss or distraction of significant artifacts	Action to recover and preserve artifacts.	Alteration of terrain that threatens significant scientific, prehistoric, historic, or archaeological data.	36 CFR Part 65	Not an ARAR	Scientific, prehistoric, historic, or archaeological artifacts may be present at MCAS Yuma. However, response actions for ACM at MCAS Yuma do not require alteration of terrain or excavation of native soil.
Endangered Species Act, 16 USC 1531 et seq.; and Fish and Wildlife Coordination Act, 16 USC 661 et seq.					
Critical habitat upon which endangered species or threatened species depend	Action to conserve endangered species including consultation with the Department of Interior.	Determination of effect upon endangered or threatened species its habitat.	50 CFR Part 200, 50 CFR Part 402 and 33 CFR Parts 320 - 330	Not an ARAR	Federal threatened and endangered species have been recorded as being potentially present on MCAS Yuma. Sites with ACM are located on populated and highly trafficked area and do not support wildlife. Response actions at MCAS Yuma is not anticipated to affect habitat.

Table 2-12: Potential ARARs for Remedial Action for MCAS Yuma

Medium/ Location	Requirements	Prerequisite	Citation	ARAR Determination	Comments
LOCATION SPECIFIC - Continued:					
Migratory Bird Treaty Act of 1972, 16 USC 703					
Migratory bird area	Protects almost all species of native birds in the U.S. from unregulated "take," which can include poisoning at hazardous waste sites.	Presence of migratory birds.	16 USC 703	Not an ARAR	Migratory birds have been observed on and in the immediate vicinity of MCAS Yuma. Sites with ACM are located on populated and highly trafficked area and do not support wildlife.
Arizona Revised Statutes, Title 41 - State Government, Chapter 4.1 - History, Archaeology, and State Emblems; Article 4 - Archaeological Discoveries					
Within state- owned or controlled land containing archaeologic al at historic features	Prohibits excavation in or upon, defacing, or altering archaeological or historical site or objects; and require notification upon discovery of any such site or object.	Existence of archaeological, paleontological, or historic site or object at least 50 years old	ARS 41-844A	Not an ARAR	Archaeological or historical site may be present at MCAS Yuma. Sites with ACM are not located on archaeological or historical sites or objects. Response actions for MCAS Yuma do not anticipate excavation of native soil.
ACTION-SPECIFIC:					
Clean Air Act, National Emission Standards for Hazardous Air Pollutants (NESHAP); USC 7401 to 7671(q)					
Waste, Soil, and Debris	Management of ACM and notification requirements	Demolition, renovation, or removal of ACM	40 CFR Subpart M; Section 61.145, 61.150, and 61.154	Relevant and Appropriate	NESHAP apply to demolition or renovation of facilities with ACM. Remediation of ACM at MCAS Yuma is neither a renovation nor demolition operation. However, procedures for asbestos emission control (Section 61.145(c)); procedures for ACM waste handling, transportation, and disposal (61.150), and compliance of disposal facilities accepting ACM waste with Section 61.154 is considered relevant and appropriate,

Table 2-12: Potential ARARs for Remedial Action for MCAS Yuma

Medium/ Location	Requirements	Prerequisite	Citation	ARAR Determination	Comments
To Be Considered(TBC): Chief of Naval Operations Instruction(OPNAVINST), 5100.23D Chapter 17					
Waste, Soil, and Debris	Exposure to asbestos fibers	Use, removal, and disposal of ACM	5100.23C, Chapter 17	Potential TBC for ACM at CAOC 4, 7, and 9	The Navy manual provides guidance for controlling or eliminating the exposure of Navy personnel to asbestos during the use, removal, and disposal of ACM. Since these provisions apply primarily to building structures and facilities, it is not considered to be relevant and appropriate. In addition, since compliance with NESHAP and federal OSHA is sufficient to protect human health and the environment, this manual is not considered TBC.
U.S. EPA Guidance on Remedial Actions Superfund Sites with PCB Contamination USEPA/540/G-90/007					
Soils with PCB Contamination	Approach for evaluating and remediating sites with PCB contamination.	Soils contaminated with PCBS.	USEPA/540/G-90/007	Potential TBC for PCBs at CAOC 8A	Describes recommended approach for evaluating and remediating sites with PCB contamination. Since compliance with ARS 49-151 and 152 is sufficient to protect human health and the environment, this guidance is not considered TBC.

## Figures

<IMG SRC 98028F>  
<IMG SRC 98028G>  
<IMG SRC 98028H>  
<IMG SRC 98028I>  
<IMG SRC 98028J>  
<IMG SRC 98028K>  
<IMG SRC 98028L>  
<IMG SRC 98028M>  
<IMG SRC 98028N>  
<IMG SRC 98028O>  
<IMG SRC 98028P>  
<IMG SRC 98028Q>

### Use This Space to Write Your Comments

Your input on the proposed remedies for Operable Unit 2 is important to MCAS Yuma. Comments provided by the public are valuable in helping MCAS Yuma select a final remedy for the various CAOCs. You may use the space below to write your comments, and then fold and mail. Comments must be postmarked no later than April 21, 1997.

<IMG SRC 98028R>